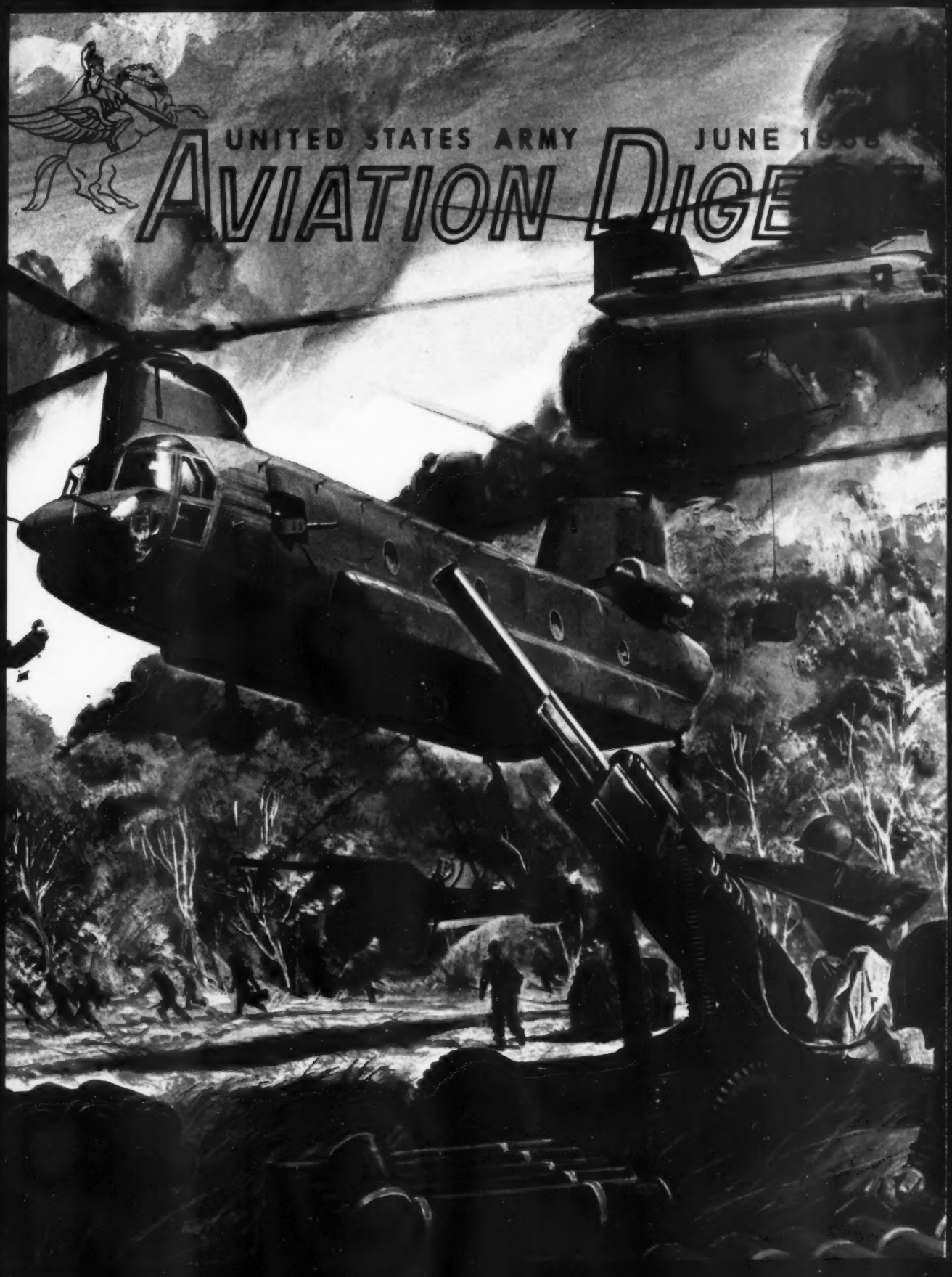
UNITED STATES ARMY
JUNE 19
AVIATION DIGE

UNITED STATES ARMY AVIATION DIGEST

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The purpose of the U. S. ARMY AVIATION DIGEST is to provide information of an operational, or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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Two's Company, But Is Three Really a Crowd?

One might update a World War II adage to read "The VC you don't see is the one that shoots you down." With such a thought in mind the author writes that ideally a helicopter gunship should have a crew of three to provide 360° visibility in the horizontal plane, 180° downward in the vertical plane, and 60° upward

Lieutenant Colonel R. J. Farwell

NOBODY would deny that the helicopter gunship is now an essential part of American Army aviation. The conflict in Vietnam has proved this, if proof was needed, and operational use has provided the proving ground for a variety of weapon systems and also helicopter gunship tactics. As a result the Huey gunship, the UH-1C with its weapons systems, is now an integral part of all ground operations in Vietnam.

The development of the helicopter gunship was dictated by operational necessity with a result that converted troop carrying helicopters were, and still are, used for this role, with all the attendant disadvantages this posed. Consequently, notwithstanding the fact that a contract for a sophisticated advanced aerial fire support system was placed in 1966, which promised prototype rollout in April 67 (the Cheyenne) and production delivery in 69, there was a great demand for an interim helicopter gunship as early as possible. Bell Helicopter Company is meeting this need with the HueyCobra.

The performance characteristics of both the HueyCobra and the Cheyenne are well known and will not be repeated. In general anything the HueyCobra can do the Cheyenne can do better. Both have a higher speed, smaller frontal silhouette, greater firepower, and better armour than the current UH-1C gunship. But, and it's a very interesting "but," they also both have a smaller crew, smaller by half.

It is this aspect which interests me personally. It also undoubtedly interests any other army which is considering the introduction of a gunship into their aviation, but is not forced into precipitate action by being involved in a current conflict.

When considering the crew necessary for any vehicle it is essential to consider the mission of

that vehicle and its tactical employment. The missions for the armed helicopters have been stated to be three: direct fire support; escort, particularly in escort of airmobile forces and all that this entails; reconnaissance and security. Lack of numbers, which other armies are likely to suffer, may greatly reduce the number of missions which the armed helicopter can accept. However in general, the armed helicopter gives the ground commander a new highly mobile and flexible form of firepower, whose uses are largely dictated by their availability and the imagination of their commander.

Their main limitations are vulnerability to concentrations of well aimed machinegun fire and air attack. Experience in Vietnam, with the UH-1C gunship indicates that it can take a great deal of punishment from .30 and .50 calibre MG, contrary to prior belief. No information is currently available on any heavier weapons, though press reports indicate that the 35 mm Oerlikon gun may shortly be used by the Viet Cong. It would also appear that the majority of attacks on helicopter gunships are delivered either from the side or rear, which is not really very surprising.

Evidence from Vietnam indicates that vulnerability to ground fire is reduced by using weapons with stand off capability, by provision of adequate covering fire during the pullout from an attack run, and by rapid appreciation of the enemy ground threat by good all-round observation. In low intensity conflicts and in highly mobile operations the enemy you see and engage is frequently not the only enemy in the local area. The World War I and II fighter pilot adage "The Hun you don't see is the one that shoots you down" is by no means out of date.

There is no evidence as to vulnerability to air attack which may be mounted by fighter aircraft or, in the not so distant future, by hostile helicopters. However, it is certain that their vulnerability will be reduced if they are capable of firing back and if they have adequate warning of an attack.

Current tactics employ gunships in fire teams of two, for mutual support, and as many fire teams are committed to the battle as are considered necessary. Attack formations and patterns are dictated by enemy dispositions, terrain, weather, and the battle plan. Two gunships were considered necessary to give the essential covering fire during the break from an attack or when suddenly fired on, and was undoubtedly influenced by the capabilities of the UH-1C gunship.

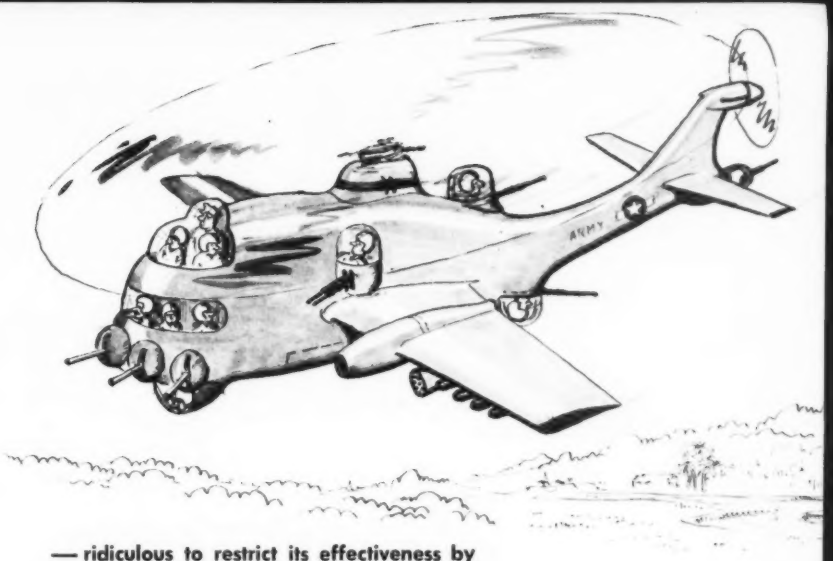
How will the HueyCobra and Cheyenne compare with the UH-1C? Undoubtedly their heavier firepower and the Cheyenne's more sophisticated sighting system will mean they can give greater and more effective fire support. But what of their vulnerability? I have heard the argument that their higher speed will give them greater protection. I believe scientifically it has been proved that, over 40 knots and below 400 knots, variations in airspeed make little difference to hit probability. So I do not believe that because the HueyCobra can attack at 190 knots and the Cheyenne at 220 knots, against the 110 knots of the UH-1C, it will make the new helicopter gunships very much less vulnerable, although it will undoubtedly reduce their hit probability slightly.

Armour protection will be more effective, and this too will slightly decrease their vulnerability, as will their smaller frontal silhouette. However, their side silhouette is even larger than the UH-1C so this may not be an advantage after all. But in one very important fundamental they will be worse off: they will only have two pairs of eyes whereas the UH-1C has four.

At present the UH-1C gunship has excellent all-round visibility. The four crewmembers, because of the human attribute of peripheral vision, can keep watch over the area around and under the helicopter, with the exception of a small area to the immediate rear. They can also engage targets in four different directions simultaneously.

The HueyCobra crew will have visibility over an arc of 120° each side of the nose, a total of 240°, but they cannot see under the aircraft and are blind behind. However, a crew of two should be able to maintain an effective watch over this forward arc. The Cheyenne will have similar visibility from the cockpit with the added advantage that the gunner will have a sight giving 360° traverse below the helicopter. However there is very considerable difference in maintaining a watch and being able to see, since once a weapon sight is used the field of view is immediately reduced from about 150° to 20°. All this means that both the Cheyenne and HueyCobra are going to be largely blind to a large segment behind and underneath the aircraft.

Before too much is read into this, it is vital to know just how much importance to attach to this all-around watch, as opposed to visibility. This is very much a personal opinion and only in combat in Vietnam can this be formed. Unfortunately I do not have this experience and have to rely on hearsay evidence from Vietnam veterans. I have discussed this with a number and am convinced that it is vitally important. All have stated that they would be most reluctant to go into combat without either of their door gunners, and the idea of putting "blinkers" (to reduce this angle of vision to



— ridiculous to restrict its effectiveness by not giving it an adequate crew

20°) on them, to simulate the view through a sight, did not thrill them either. They seemed to value them equally as giving all-round watch, and for controlling additional separately operated weapons.

So what is the requirement for visibility in the ideal helicopter gunship to enable it to do its job, which essentially means flying and fighting at low level and being able to live in the forward areas? It is my opinion, based on my experience gained at Fort Rucker, that the crew of the ideal helicopter gunship must have, as essential, 360° visibility in the horizontal plane, 180° downward in the vertical plane, and 60° upward. The crew must be able to maintain an effective watch over these arcs, particularly the side and rear, and this cannot be achieved by using a narrow angle sight. It is also highly desirable that when a target is being engaged by one crewmember another crewmember should be able to take over the responsibility for watching the fringe areas which he cannot then adequately cover.

It is now necessary to look at the duties of the crew. I have not considered weapon systems and their operation, but other duties are of interest. The aircraft has to be controlled at higher speeds than we now use and possibly at lower altitudes than today. Navigation is going to be very important, particularly as the operating altitudes are reduced, and although various advanced aids will be fitted they will still have to be operated and monitored. The aircraft has to be commanded, and this may involve command over other aircraft as well, and fought in response to the constantly varying tactical situations. Communications have to be monitored and this usually involves three wireless sets and maybe more. And the weapons systems have to be manned.

There is also the work of rearming weapons and refueling, frequently at a forward supply point where there is no spare manpower to assist, and minutes wasted in this could be very precious.

From this we can deduce the crew size. Undoubtedly there are some sterling aviators who say that this can all be done by a pilot and copilot/gunner. In fact, there may be some who feel that they don't really even need a copilot gunner.

However, my own personal view is that for optimum utilization and effectiveness of the airborne weapons system the crew must consist of the following: An aircraft commander who is also the pilot; a gunner/navigator who is also the copilot; and a gunner/observer who is also the crewchief. The gunner/navigator would be responsible for observing the forward arc and controlling weapons, and the gunner/observer for observing and controlling weapons in the rear arc.

This makes a crew of three. Not as many as at present used in Vietnam but I think sufficient.

The problem of cost effectiveness, that awful word that politicians and financial wizards have made soldiers hate, has a definite bearing here. The helicopter gunship of the future is going to be extremely costly, and it would be ridiculous to restrict its effectiveness by not giving it an adequate crew.

Some years ago a story was going around about an Air Force squadron stationed in Alaska. It had just been re-equipped with two-place attack fighters to replace their single-seat ones, and the old pilots had been converted on to the new type. This had not been a welcome change and many and heated had been the arguments for and against the two-place ships.

Shortly after this a new commanding officer was posted in, and after his first flight he was immediately questioned as to his views on the current arguments. "Well," he said after some thought, "as you all know I've spent most of my life flying single-place ships. However, I think the territory up here is cold and hostile and I'm for the two-place ship — since if you have a flameout you'll be awful cold and lonesome out there and your navigator can keep you warm, and don't forget if you run out of food you can always eat the b." Pilot morale immediately rose, and receipts for "jerked navigator" were soon on offer.

I'm not suggesting that we should consider "gunner stew," but rather that instead of one course we as pilots should at least be entitled to two.

Jungle Survival

...or, How I Learned To Stop Worrying And Love The Jungle

Captain Clifford M. McKeithan

THE TROPIC sun sent rivers of perspiration coursing down the back of my aching neck as I strained to see down the bushy jungle path. My lungs were almost bursting as I held my breath, my ears cocked to hear the slightest sound. Beside me, an Air Force major, clad in a sweat soaked flight suit, tensed suddenly and motioned for me to get down. The elephant grass had barely stopped swaying as I heard the quick padding of bare feet along the trail we had been waiting to cross.

From out of the noon blackness of the jungle appeared the diminutive forms of the Negrito headhunters, naked but for a scanty breech cloth and armed with vicious looking bows and poison tipped arrows. The bright sun in the clearing made their sharply filed teeth glisten as they spoke rapidly to each other. Their nostrils flared as they sniffed the air for a scent of us. By the grace of a favorable wind, the scent of our perspiring bodies did not reach them. With aching lungs and blood pounding in my ears, I watched as their feet passed within yards of our hiding place and disappeared down the trail.

The air exploded from my lungs and my straining muscles went flaccid as I knew we had a brief respite from capture. After a rest to get our lungs functioning normally, we cautiously stole across the trail and melted into the darkness of the jungle beyond. As we slowly made our way farther and farther from this latest contact with our pursuers, my mind recounted the events which had cast an Army and Air Force pilot together in a survival and evasion situation.

CPT McKeithan shares his experiences encountered while attending the Pacific Air Force Jungle Survival School in the Phillipines. The school, highly respected by all services, proved to be a match for even the most cunning aviator.

A scant week before I had been flying photo and visual reconnaissance in the An Lao Valley. Nothing more exciting than an occasional bullet in the triple tail of my Mohawk (Charlie still had not learned to lead!) had occurred to disrupt the routine. I had just finished a debriefing by the imagery interpretation section and strolled into the "Hawks Nest" for a cup of coffee when I was greeted by the sphinx-like smile of the ASTA Platoon leader.

"Mack, old boy," came the too jovial query, "how would you like an expense paid R&R in the Phillipines?" After 5 seconds of careful deliberation and three unemotional backflips, I accepted. Two days later, I boarded a jet in Saigon, bound for the Pacific Air Force Jungle Survival School at Clark Air Force Base in the Phillipines.

Upon arrival at Clark, I found that I was one of four Army pilots in a class of 40 Air Force pilots who were attending the school en route to Southeast Asia. The majority of these were FACs and "Thud" (F-105) drivers, with a smattering of F-100 and F-101 jocks thrown in. Among these companions, I felt like Mickey Mouse at the Tom Cats' Convention. Initial apprehension soon dissolved, however, as fish-eyed stares gave way to bantering.

Our first day was occupied with lecture-type instruction, led off by an excellent and detailed environmental study of Southeast Asia. Terrain and vegetation were discussed in accurate detail. This was followed by a discussion of food and water sources. We soon learned that no man need go hungry or thirsty in the jungle.

After a hearty meal at the Officers' Club, at which I consumed a large salad (rare in VN), we returned to the classroom. The afternoon was spent in discussion of escape and evasion techniques. It was interesting to note how closely the doctrine taught by the Air Force followed that taught by the Army Aviation School at Fort Rucker, Ala., (see "Escape and Evasion," March 1968 DIGEST).

A large portion of the discussion was oriented toward operations over North Vietnam, but the lessons were still applicable to the south. Of particular interest to me were the search and rescue operations conducted by the Air Force in the north. I could not help but note the confidence it instilled in the Air Force pilots attending the course.

A high point that afternoon was a discussion of survival kits in use and under development. It was there that I first saw the rocket jet kit which is now being considered for adoption by the Army. It was indicated that at long last we may have a tri-service standardization of survival equipment, which, we hope, will lead to more rapid procurement and availability of this gear.

We were taught the use of flares, which could mean life or death to us

Bright and early the next morning, we were introduced to various helicopter pickup devices in use. Each of us was given an opportunity to hang in the old standard horse collar. Later in the period, each student received an actual pickup by a UH-19 using the jungle penetrator, a device which can be lowered through the jungle canopy to pick up a downed aviator. We were also shown the use of a compact lowering device which allows one to get down safely from the tops of trees as high as 150 feet. We then were shown a static display of animal snares and traps along with an assortment of punji stake traps used by the Viet Cong.

That afternoon, we were broken down into groups and introduced to an NCO instructor and a Negrito guide for the upcoming field instruction. A quick trip by UH-19 put us into an area of dense jungle, where we set up a base camp. Carlito, our Negrito guide, demonstrated how to cut and handle bamboo safely, then showed us how to quickly fashion a shelter from bamboo and banana trees.

We went to work and found that Carlito's skill made the task look deceptively easy. By the time we finally finished our shelters to the satisfaction of Carlito's critical eye, the black of the jungle night had settled upon us. We cooked our evening meal of diced Spam and boiled rice over a communal fire and passed the evening exchanging war stories. It was at this time that the Army pilots held the edge, as we regaled the jet jockeys with our tales of "what the war is really like."

Our first full day in the jungle passed quickly as we learned how to signal aircraft with flares, smoke, mirrors and radios. Each man was taught to guide in a rescue chopper by giving him trial headings, listening to his sounds and correcting the headings. The remainder of the day was spent in escape and evasion training. Carlito demonstrated how to move through the jungle silently. When we tried it, the noise resembled a "Chinese fire drill." He then showed us how to move through the thick undergrowth and simultaneously erase our tracks. We were then put out to conceal ourselves. After a 30-minute period, Carlito would attempt to find us.

We applied all the lessons we had learned and moved slowly and painstakingly so as to leave no trail. Quite self-satisfied, we hid and awaited Carlito's futile efforts to find us. We smugly watched him move up the trail, confident that he would pass us by. We were stunned as he stopped, sniffed the air, and walked straight to our cleverly concealed hiding place. Mumbling to ourselves, we returned to camp to find the rest of the group already there. They, like we, had not reckoned with Carlito's ability to track by scent and had hidden upwind of the trail. We had learned a valuable lesson. That night around the campfire, the topic for discussion was things we had learned rather than the war tales of the night before.

Day number three came and the instructor informed us that "Daddy's going to take you on a hike through the woods." We wound slowly through the woods, stopping periodically as Carlito pointed out edible plants and showed us how to identify poisonous plants. As we wandered along, we gathered plants with which to prepare a gourmet meal that evening. The afternoon was spent in learning to tap water from bamboo stalks, hanging vines,

banana tree stumps, and the wondrous muluchbe tree. We found that with patience one could gather enough water from plants to take a complete bath.

That evening, we set about the task of cooking our plants in the native manner, in pots fashioned from sections of bamboo. Even with our amateur gastronomical abilities, the meal was a splendid success and each man went to his bunk with a full stomach.

The morning of the fourth day found us breaking base camp and preparing for the escape and evasion problem beginning that afternoon. We went through our equipment and selected those items we wanted to take along. My buddy, the Air Force major, and I elected to travel lightly for speed and silence.

As we worked, the ground rules were explained to us. We would be lifted to an assembly point and released along a road. One hour later the Negrito headhunters (Headhunters? Egad!!) would be released to pursue us. Our adrenalin levels came back to a shade above normal when we were told that the Negritos would not be after our heads but the three chits we carried, each entitling them to a ration of rice. It was hoped that the chase would lend an air of authenticity to the problem.

The Air Force major and I set out, moving rapidly at first to gain the advantage of distance. Then we began to move more carefully, covering our tracks and staying downwind of the native hunters. Each trail and each clearing became a thing to avoid as we worked our way to high ground. We found a rugged area of steep hills and deep ravines, where movement was limited to a few feet a minute to prevent leaving a trail. By a devious route, we made our way to a thickly wooded peak and made a pocket under some thickly thatched bushes.

From this vantage point, we could survey the area for a half mile in all directions and could not be approached silently. The sun was setting as we finished our meal and began a shift system of sleeping and maintaining watch. If we could remain undiscovered until the rescue helicopters came at 0900, we would be home free.

The heavy black night was the longest I had ever experienced. On my watch shifts, I could hear the rustle of small animals in the brush nearby and the occasional, almost silent, movement of a Negrito searching the ravine below us. My straining eyes fooled me into seeing blurry shapes moving all around us. I had to fight an impulse to throw a rock or stick at the imagined assailants.

When at last, the first light of morning greyed the sky, I was able to dispel the imaginary hunters lurking behind my back. I woke my companion and we silently broke camp and moved slowly and deliberately toward our pickup point. Several times, we had to circumvent a hut or farm. To be caught now would be a big letdown after our successful night.

A most blessed sound was the "whop-whop-whop" of the approaching helicopter. As it came almost above us, I popped the smoke end of a MK-13 flare. The horse collar snaked down twice and we were on board, heading for home.

As I sat on the jet back to Saigon, I recounted the things I had learned in the past week. Now I was confident that I could survive on my own in the jungle. Then I thought of what I would say to the ASTA Platoon leader concerning my "R&R." Well, I had the last laugh there. For three days after the course ended, transportation was not available back to Saigon. I was forced to spend my time waiting at the Clark AFB Officers' Club, stuffing myself on fresh salads and sampling that fine "San Miguel" beer.

Several times we had to circumvent a hut or farm

AACVOC

The Army Aviation Commanders Vietnam Orientation Course offered at the U. S. Army Aviation School, Ft Rucker, is based on lessons learned and the combined experience of RVN returnees. If you are an Army aviator heading for Vietnam you may be eligible, depending on your actual or anticipated assignment

Major William S. Bayer

IN EARLY 1966, senior Army commanders determined that a requirement existed for properly orienting senior field grade Army aviators on the facilities, operations, conditions, and local procedures used in the Republic of Vietnam.

It was determined that a new course should be developed which would include all appropriate subjects desired to completely orient these aviators before their deployment to Vietnam. Further, Department of the Army would control the input to this course.

The Deparment of Tactics at Fort Rucker would have proponency for presenting the new course at USAAVNS.

Based on interviews from selected Vietnam returnees, feedback data from RVN, commanders' reports, and lessons learned, a proposed program of instruction was conceived.

In May 1966, the draft program of instruction was prepared and sent to Vietnam for review/comment from the field. Concurrently, concept approval for the new course was requested and received from the Assistant Chief of Staff for Force Development, Aviation, Washington, D. C.

After receiving comments from RVN, further staffing was conducted on the proposed program of instruction, and finally in July 1966 USCONARC approval for the course was requested. Approval was granted; thus the Army Aviation Commanders Vietnam Orientation Course (AACVOC) began.

Now, let's see what this new AACVOC offers to the Army aviator. The course is 2 weeks long and consists of an input of 17 students per class, 6 classes per year, and is taught at the U. S. Army Aviation School, Fort Rucker, Ala. The student must be a rated Army aviator, a member of the active Army or a reserve component whose actual or anticipated assignment is to an Army aviation command or staff position in Vietnam, and he must have an interim secret security clearance.

The course is continually updated, offering the most current information. This is based on lessons learned and the combined experience of RVN returnees.

Students attending the course receive practical instruction in airmobile planning and support operations. This includes a seminar during which students can question recent returnees on actual conditions and types of operations conducted in Vietnam. They are briefed on the latest aviation hardware and are introduced to new systems used in Vietnam.

The subjects covered in the program of instruction are presented by instructors with previous Vietnam experience. These instructors are from practically every USAAVNS instructional department. The scope of instruction presented by each department follows.

Tactical subjects: This annex to the program of instruction provides a historical, geographical, and organizational background essential to understanding United States involvement in Vietnam. It provides the organization of aviation and non-aviation units located

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MAJ Bayer selected his topic to help keep Army aviators and commanders advised of the training and orientation the Army's Aviation School is providing for its Vietnam destined commanders.

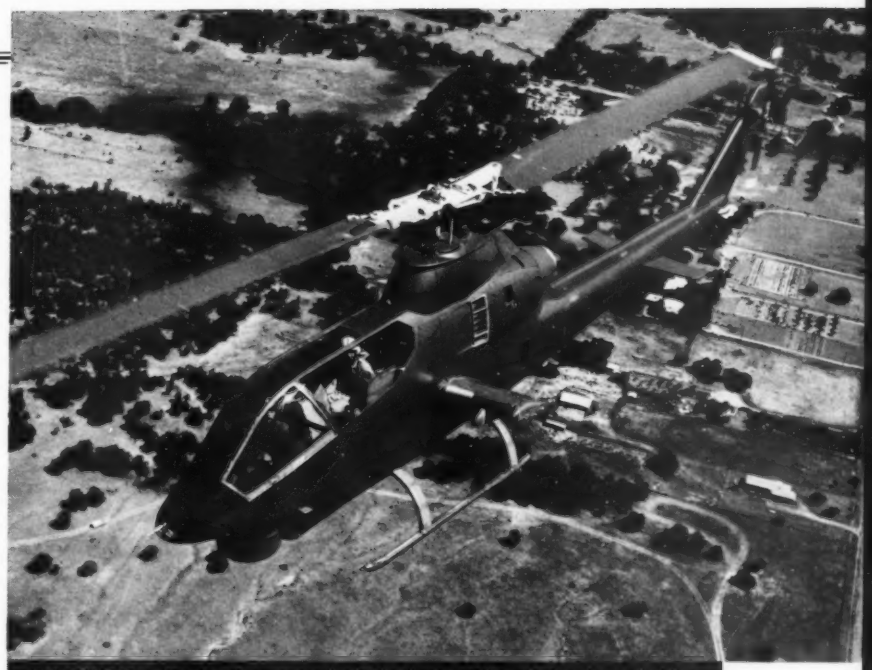
incountry that are essential to an understanding of the various U. S. efforts in Vietnam. It also contains information on supply and maintenance problems relating to new or critical material used in RVN by U. S. forces. Finally, instruction is provided to develop aviation procedures currently in use.

The Special Subjects Division, Department of Tactics, provides instruction to familiarize students with components of the Decca navigational system and the Decca chain in Vietnam.

Department of Rotary Wing Training: A briefing is presented on the tactical instrument system to include ground equipment, flight procedures, pilot responsibilities, flight planning, and air traffic control. Almost without exception, all rotary wing aviators graduating from the Army Aviation School are issued a tactical instrument card; therefore, it is essential that all future Army aviation commanders understand this system and the pilots' capabilities and limitations.

Department of Aeromedical Education and Training: This class covers the medical units located in Vietnam to include their support capabilities and limitations. A discussion is conducted on various reported medical problems encountered and their prevention and control. This includes, but is not limited to, insect, sod and water borne diseases, heat prostration, fungus diseases, and physical fitness.

With this newly conceived Vietnam oriented course now being conducted at the United States Army Aviation School, ample opportunity is available for all senior Army aviation command and staff officers, whose anticipated assignment is to Vietnam, to attend and further enhance their knowledge of problems encountered there.



AACVOC students are briefed on the latest aviation hardware, such as the HueyCobra (above), and on Vietnam conditions and operations, such as those below in which members of the 1st Cavalry Division board a Huey in Quang Nai Province

Medevac, Chinook Style

As the flight engineer started lowering the cable by a mechanical hoist, a burst of machinegun fire rattled the ship. The flight engineer was seriously wounded and the crewchief slightly wounded

Captain Jasper K. Champion

THE TIME WAS early November 1966, and the 4th U. S. Infantry Division had just moved into a blocking position near the Cambodian border in South Vietnam. The 4th had been incountry for only a couple of months and was still getting adjusted to this different type terrain and concept of warfare.

The 4th Division and the 3rd Brigade of the 25th Infantry Division had been moved in to stop any infiltration or mass attacks on the nearby Pleiku area.

A platoon of the 4th was overrun about 1800, just before they were to dig in for the night, and received heavy casualties. The jungle was so dense and the platoon's position so remote from any clearing that could serve as a landing zone that the Huey Dustoffs (medevacs) couldn't be brought in. The trees in the area were over 100 feet high, and with the density altitude at about 6,000 feet, the Hueys were unable to hover out of ground effect and hoist in the casualties.

A Kaman Huskie, HH-43, Air Force crash rescue helicopter, from nearby Pleiku Air Force Base was called in for a hoist medevac. The aircraft was able to recover three wounded men before a North Vietnam Army rocket launcher literally blasted it out of the sky. The three wounded were killed and the crew seriously injured. Another Huskie was able to pick up the survivors.

After the rescue ship had landed at 4th Division forward command post, I talked to the pilot about the possibility of getting some of the collapsible canvas litters that the Air Force uses for this type of mission. Our CH-47 unit had been unable to procure any through normal supply channels. He replied, "Buddy, come on over to the base (Pleiku Air Force Base) and I'll give you all I've got."

Henceforth, our CH-47 aircraft supporting the 4th Division had a collapsible litter aboard.

About 1800 one afternoon, one of our ships got an emergency call to hoist medevac about a dozen wounded from the jungle. Again there were no LZs and the trees were too tall (over 100 feet) for the Hueys to safely hover out of ground effect and pull the wounded out. The ground commander reported a secure area with no contact with the enemy, so our "Hook" proceeded inbound to the approximate position.

The jungle canopy was so thick that no smoke grenade would penetrate it, making the search for the wounded almost impossible. Through radio direction by the ground commander, who could hear the aircraft and thus direct it, the Hook hovered close to the spot. As the flight engineer started lowering the cable by a mechanical hoist, a burst of machinegun fire rattled the ship.

CPT Champion offers a method of hoist medevac with the CH-47 he and other members of his unit utilized in Vietnam. He relates of the problems encountered and methods used to overcome them.

ARMY

The flight engineer was seriously wounded and the crewchief slightly wounded. The pilot was able to quickly pick up the aircraft and land it at a battalion LZ at the foot of the mountain. The crew was flown out and the aircraft was evacuated the next day.

From the direction of entry of the bullet, it was determined that the ground fire came from almost directly beneath the aircraft, which meant that the enemy must have been within 100 yards of the friendly ground forces, undetected at that time.

The next morning my Chinook was dispatched to hoist medevac the casualties out. We removed our cargo hook, rigged the pulley system in the ceiling of the cargo compartment to support the cable, and picked up an extra crewmember for the mission. The crew normally consists of a pilot, copilot, flight engineer, and two gunners. To efficiently perform a hoist medevac mission, an extra man is needed over the cargo hatch to aid in pulling in the wounded or KIAs (killed in action).

Our operations gave us the coordinates, FM frequency, and call sign of the ground troops, so we proceeded to the general area. The location was on the side of a steep mountain, covered with 100-foot tall trees thickly entwined with heavy vegetation. The jungle there could best be described as a rain forest, it was so thick. There is no winter season and the rains last for about 5 months, so one can well imagine the thickness of the undergrowth. One must understand this to realize how difficult it is to locate any position on the ground.

After making contact with the ground commander, we used our FM radio to home in on his position. Still he had to throw four smoke

The trip back up the cable took about the same time as going down

grenades before we were able to locate his position. After making an almost vertical descent from about 1,500 feet above his position, we nestled the aircraft at a hover a few feet from the top of the trees. Even with this close contact with the trees the rescue hook was never able to reach the jungle floor, hanging at about 5 feet above the ground.

Our rescue hook and cable, fully extended, is 115 feet below the aircraft, so I estimated the trees to be about 120 feet high. The hole in the trees through which we lowered the hook must not have been more than 6 or 7 feet in diameter, requiring us to hover very steadily to keep from tangling the cable in the underbrush.

As I nestled down into the top of the jungle canopy, I used a distinctive looking treetop, about 50 feet away and same altitude, as a reference to keep a steady hover both longitudinally and laterally.

Lowering the collapsible litter to the ground took about a minute and a half. The litter weight was not enough to pull the cable out of the reel, so the crewchief manually pulled it out. The ground troops then took the litter off the hook and carefully secured the first of the wounded. The trip back up the cable took about the same time as going down. As the patient approached the open hatch, the flight engineer had to reach down and pull him in. The rigging does not allow the hook to be pulled upward any higher than the hatch opening. The wounded man was then removed from the litter and placed on the floor (our Chinook had been on sling load missions and was not rigged with internally mounted litters).

After our crew and the ground troops became more adept at the operation, we were able to retrieve a wounded man every 5 minutes and KIAs every 3½ minutes. The difference in time being that necessary to work carefully in securing and removing a wounded man from the litter.

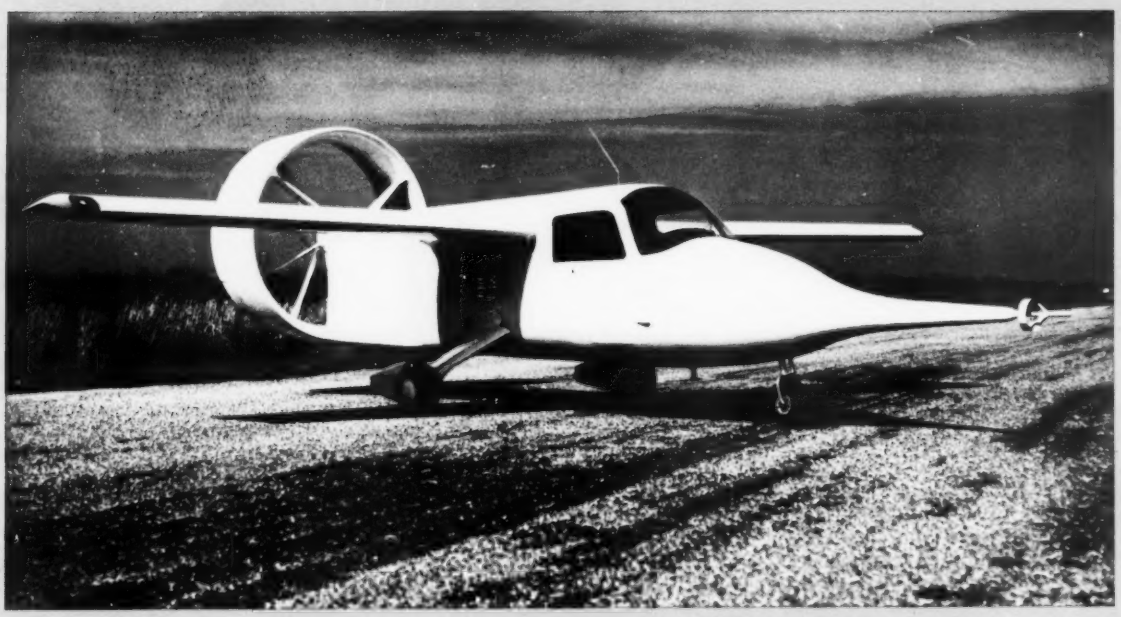
After we had hoisted about 15 wounded into the aircraft, we returned to the brigade medical clearing station where we turned over the wounded to the medics. We also refueled before returning to the pickup site.

During the evacuation, the left and right gunners had to care for the more seriously wounded, leaving the aircraft vulnerable to enemy fire. Three of the wounded were bleeding so badly that I am sure they would have died without the help of our gunners.

After two fuel loads and about 2½ hours of hovering, we had evacuated 26 wounded and 15 dead.

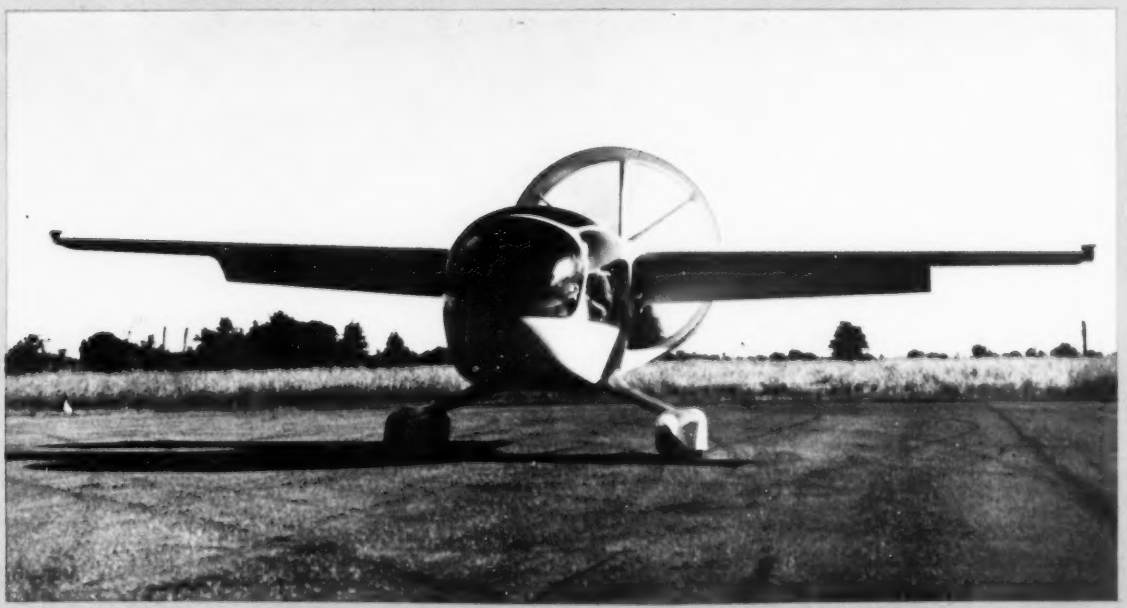
As we headed back to Pleiku and Camp Holloway the monsoon rains beat against the windshield. We all had sick feelings in our stomachs from seeing so many dead, but everyone felt that we had provided a much needed service to the gallant 4th Division troopers in this dismal war.

During the evacuation, the gunners had to care for the more seriously wounded

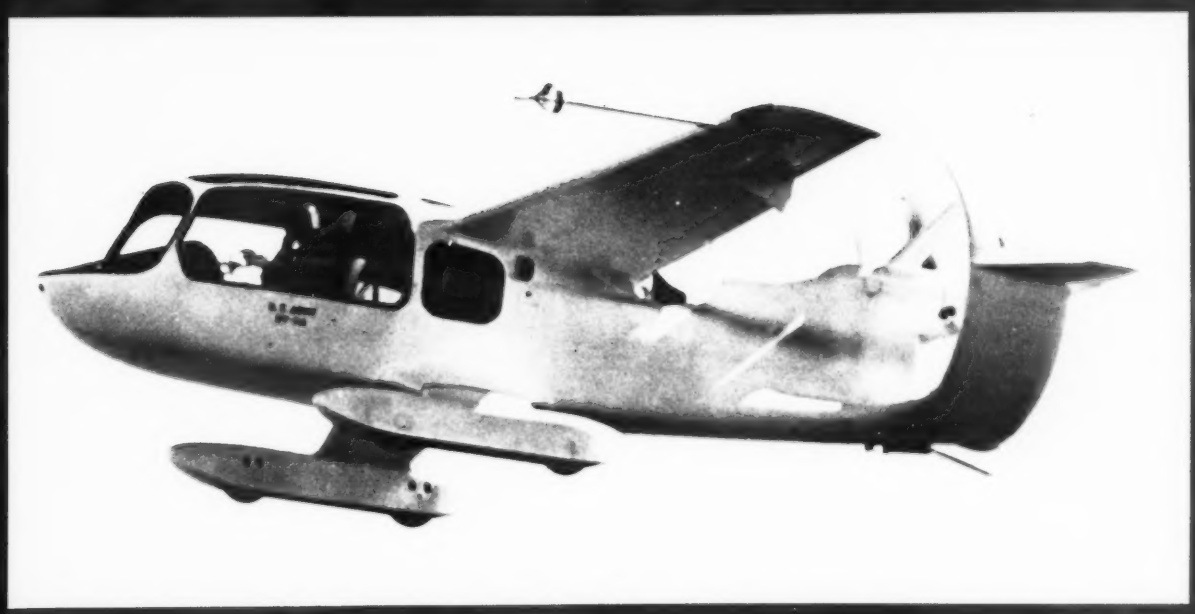


EVOLUTION OF THE XV-11A MARVEL

The MARVEL concept was born at Mississippi State University in 1955 to explore the boundary layer control potential on three fronts — laminar flow, high lift, and high thrust. Initially the XAZ-1 Marvelette (above) was developed and first flown in March 1962. The XV-11A or MARVEL (Mississippi Aerophysics Research Vehicle with Extended Latitude) was first flown in December 1965 (below and facing page)



XV-11A sTOL Research Aircraft



XV-11A STOL Research Aircraft

fiberglass components of the vehicle were manufactured by Parsons Corporation and assembled by the Aerophysics Department of Mississippi State University. The research vehicle is constructed of fiberglass reinforced plastic to achieve a rigid, wave-free structure. This construction allows easy manufacture of complex shapes and easy repair of skin or structure. (See "The Army Aviation Story," Oct 1962 DIGEST).

The wing has a camber-changing mechanism which consists of two load-carrying horns in each wing supporting four subspars aft of the main spar. The electrically driven horns rotate through journals in the subspars and the trailing edge of the wing, thereby changing the camber. The subspars are piano-hinged at the top and bottom to facilitate angular movement (see figure below).

The wing has a distributed suction boundary layer control system on the upper surface to use the high lift potential of the variable camber wing. One limiting factor on the lift coefficient attainable by a highly cambered wing is flow separation. The high camber produces adverse (retarding) pressure gradients that cause boundary layer separation, resulting in a decrease or even total loss of lift.

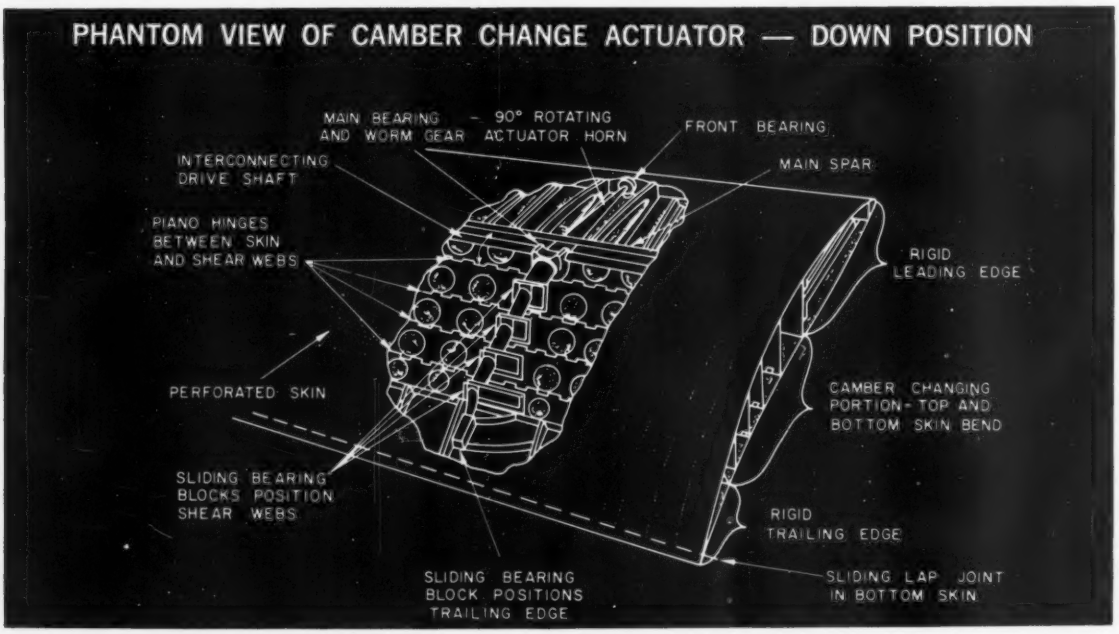
A method of preventing this phenomenon is to keep the boundary layer attached by sucking it into the wing. On the XV-11A, the boundary layer is sucked through thousands of perforations in the wing upper surface. Each wing of the aircraft acts as a single plenum chamber, with the two wings being connected to the suction source by a common duct. The flow from the wing perforations in the upper surface passes through the wing, either back through the spar and inward or straight inward. It then enters the common duct at the wing root and is guided through a 90° turn into the blower. The blower is driven by the engine from the front power takeoff pad and provides 28 inches of water suction pressure at 6000 rpm at a flow rate of 4,000 cubic feet of air per minute.

The fuselage is a stiffened shell-type structure with the pilot and passenger compartment glassed-in above seat cushion height. The long side windows are hinged at the top and act as doors. The cockpit contains a gasoline tank with a 39 gallon capacity which is designed to be used as a rear seat support.

Cruciform control surfaces operating in the slipstream of the propeller provide adequate control power even at the very low airspeeds encountered with the XV-11A. The controllable pitch propeller has reverse pitch capability and can be used for glide path control.

The pantabase gear was designed for operation from soft, muddy ground where it would not sink deeply into the mud. The undercarriage was designed for loading conditions equal to eight times the weight of the aircraft, distributed as in a normal landing.

The T-63-A5A engine is mounted in the upper center fuselage just aft


PHANTOM VIEW OF CAMBER CHANGE ACTUATOR — DOWN POSITION
MAIN BEARING AND WORM GEAR
90° ROTATING ACTUATOR HORN
FRONT BEARING
INTERCONNECTING DRIVE SHAFT
MAIN SPAR
PIANO HINGES BETWEEN SKIN AND SHEAR WEBS
RIGID LEADING EDGE
PERFORATED SKIN
CAMBER CHANGING PORTION - TOP AND BOTTOM SKIN BEND
SLIDING BEARING BLOCKS POSITION SHEAR WEBS
RIGID TRAILING EDGE
SLIDING BEARING BLOCK POSITIONS TRAILING EDGE
SLIDING LAP JOINT IN BOTTOM SKIN

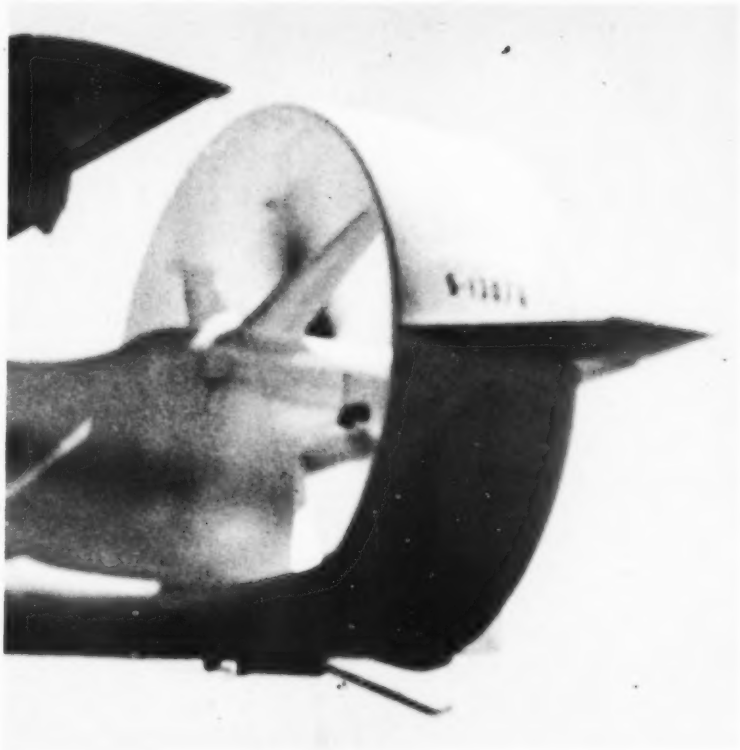
CHARACTERISTICS
Length, 23' 3"
Height, 8' 6"
Wingspan, 26' 2.4"
Engine, 317 hp Allison T-63-A5A
Gross Weight, 2,600 pounds
Vmax, 200 mph plus (predicted); 150 mph at 45% power (realized)

of the wing spar carry-through. Rigid sheet and tubular steel mountings support the engine at the sides and top of the accessory drive case. Loads are distributed to a transverse bulkhead and the upper sides of the engine box. This box is part of a stainless steel enclosure which provides a fire and heat barrier for the rest of the fuselage. Further barriers are located inside the engine box to isolate the hot portions of the engine from the gears and accessories.

A ventilating flow of air is branched from the oil cooler inlets under each wing root and directed to the coolest portion of the engine box. It then flows to progressively hotter sections and is rejoined with the oil cooler flow where it is exhausted on either side as the secondary flow of the jet pump formed by the engine exhausts issuing from the trailing edge of the wing fillets. Access to the engine box is by removal of the stainless steel bottom pan of the enclosure. Stressed aluminum hatches are provided in the upper and lower fuselage surfaces to allow access to the engine and blower.

Power for the propeller is taken off at the rear power takeoff pad as in a helicopter installation. Power transmission is via a 1⅜-inch tubular steel shaft turning at 6,000 rpm to the aft gearbox which supports the propeller and reduces the speed to 2070 rpm. The 7-foot long shaft is supported by a fiberglass housing containing intermediate bearings every 15 inches. A constant speed universal joint allows the drive to bend through 11° just ahead of the aft gearbox. The shaft, housing, and gearbox are removable from the aft end of the airplane.

The XV-11A has proved the feasibility of the unique systems incorporated on the aircraft. Within a very restrictive flight envelope (150 mph, 1.5 g.), the aircraft attained 150 mph at 45 percent maximum power and a rate of climb of 2,000 feet per minute. A takeoff groundroll of 200 feet has been achieved.



The shrouded propeller increases static thrust by 90 percent

The shrouded propeller increases static thrust by 90 percent over a similar open propeller, and provides thrust augmentation up to 100 mph. Above this speed, shroud drag overcomes any thrust increase.

Both the boundary layer control system and the variable camber wing have proved their potential for attaining high lift coefficients. A lift coefficient of 4.5 has been demonstrated in flight test.

The all fiberglass construction has proved to be structurally adequate, with minor skin repairs and structural strengthening easily accomplished. Drag has been extremely low due to the smooth skin surfaces made possible by the inherent characteristics of fiberglass.

A 30-hour flight test program is underway to provide further performance and stability data.

LT Zuments is an aeronautical engineer working on the XV-11A project in the Applied Aeronautics Division of the U. S. Army Aviation Materiel Laboratories, Ft Eustis, Va. His article is based on knowledge gained while working with the aircraft.

What's New in IFR Procedures?

The author covers some of the more significant of recent IFR changes in hopes that it will encourage Army aviators to fully use the annual written examination study guide before taking the exam

Major William H. Gardner

ONE OF THE MOST worn out salutations around is "What's new?" — or the equivalent. If that question were asked in the world of Army aviation instrument flying, you might get an answer something like this:

"Not much really, although there are new requirements for alternates. You can hold at your destination, if necessary, when the weather is bad. Special card helicopter pilots can't descend 100 feet below minimums any more, but any instrument rated rotary wing aviator can cut published visibility minima in half down to ¼ of a mile. Sliding scale is on the way out and TERPs is in, bringing new approach plates for all airfields. And there's MDA, HAA, DH, and HAT, revised copilot requirements, RVR, and you can initiate a straight-in approach if you have the visibility but not the ceiling. But as you can see, instrument flying hasn't changed much while you've been gone."

It isn't quite as bad as it sounds, but there is no question that 1968 will be remembered as a year of change in instrument flying for the Army pilot. The reason for this is two-fold. First, in February a new AR 95-2 was published. Second, by March the new TERPsized (to coin a word) approach plate had been published in FLIP for most Army and Air Force airfields. Eventually, all approach plates, military and civilian, will be TERPsized.

Since the new AR is based on TERPs, it might be appropriate to discuss it first. Just what is TERPs? It stands for *TER*minal Instrument *P*rocedures, is prepared by the FAA, and is known in some Army circles as TM 11-2557-26. TERPs establishes the terminal instrument criteria for all "locations where the United States exercises jurisdiction over instrument procedures in terminal areas."

Specifically, TERPs establishes the obstruction clearance requirements for all segments of all approaches and determines the minima for each. As the end product of TERPs is the approach plate and it is this that all pilots who fly IFR must understand; TERPs will be looked at in terms of the new approach plate format. At right is a reproduction of the Patterson / Wright - Patterson AFB NDB(ADF)/ILSRWY23R approach.

Several differences between this format and the old format are readily apparent. Some are more subtle. For example:

GCA information is given along with approach control, tower, and ground control frequencies (as applicable) in the upper left-hand corner of the approach plate. Both PAR (precision approach radar) and ASR (airport surveillance radar) are available at Wright-Patterson AFB. The frequencies and other data are found in the IFR supplement, however.

Minimum safe altitudes within 25 nm and 100 nm are not shown. Instead, enclosed in a rectangle are the figures 2,600 and 3,000, and 135° and 315° arrows are depicted. The minimum sector (or safe) altitude within 25 nm for the area northeast of the 135°-315° line is 2,600 feet and 3,000 feet in the area to the southwest. These quadrants or sectors will never be less than 90° and often one altitude is shown for the entire 25 nm radius.

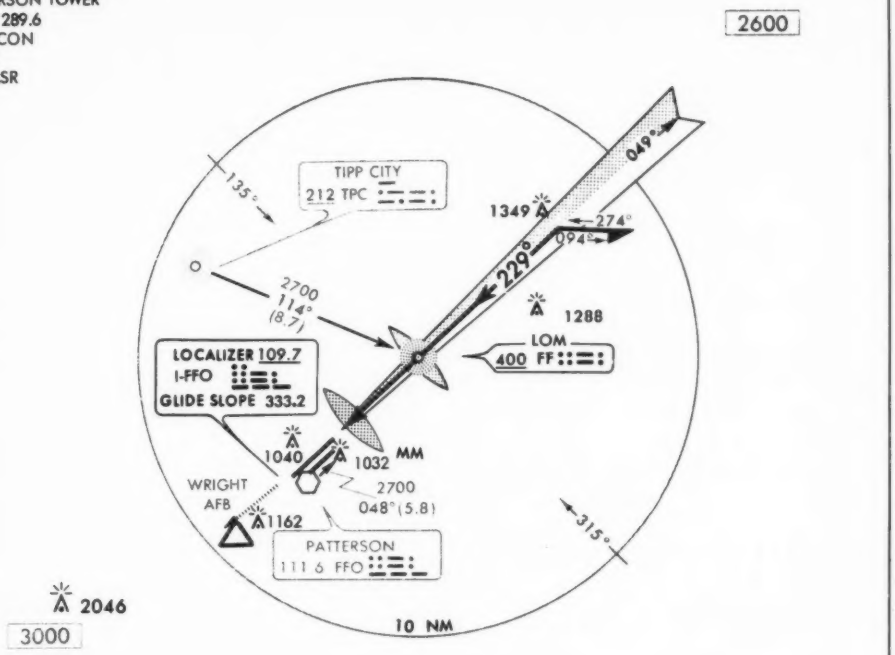
MAJ Gardner recently graduated from the Department of Rotary Wing's Examiner Course and based his article on knowldge gained there. He also is slated to write next year's writ on the subject.

NDB(ADF)/ILS RWY 23R

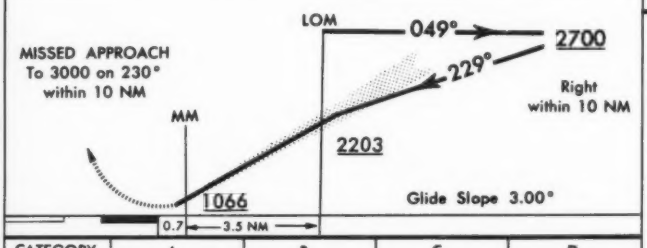
126 AL-108 (USAF)

PATTERSON/WRIGHT-PATTERSON AFB
DAYTON, OHIO

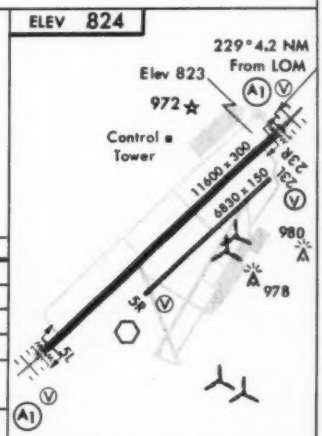
DAYTON APPROACH CONTROL
139.9 327.1
PATTERSON TOWER
126.2 289.6
GND CON
335.8
PAR/ASR



NOTE: ILS available on active runway only



CATEGORY	A	B	C	D
S-ILS-23R	1023 /24		200	(200-½)
S-LOC-23R	1220 /24		396	(400-½)
S-NDB-23R	1340 -1		516	(600-1)
CIRCLING	1340-1 516 (600-1)		1340-1½ 516 (600-1½)	1400-2 576 (600-2)



LOM to Missed Approach 4.2 NM

Knots	70	100	125	150	165
Min: Sec	3:36	2:31	2:00	1:40	1:31

NDB(ADF)/ILS RWY 23R

39°49'N-84°03'W
126

DAYTON, OHIO
PATTERSON/WRIGHT-PATTERSON AFB

What's New in IFR Procedures?

The glide slope angle for the ILS is shown.

Categories of aircraft as defined by TERPs are as follows:

Category A Speed 50-90 knots or weight 30,000 lbs or less

Category B Speed 91-120 knots or weight 30,001-60,000 lbs

Category C Speed 121-140 knots or weight 60,001-150,000 lbs

Category D Speed 141-165 knots or weight over 150,000 lbs

Category E Speed over 165 knots — weight not considered

(Speed is based on 1.3 times the stall speed in the landing configuration. The OV-1 and U-21 are presently the only Army aircraft listed in category B. Pending development of TERPs helicopter criteria, U. S. military helicopters may observe aircraft approach category A regardless of weight.)

The landing minima block is broken out by category as necessary.

For a straight-in ILS approach to runway 23R for categories A through D we see: 1023/24 200 (200-½)

— The 1023 is the DH, or decision height. Decision height applies only where an electronic glide slope provides the reference for descent, as in ILS with glide slope or PAR. It is the height, specified in feet MSL, at which a missed approach shall be initiated if the required visual reference with the airport environment has not been established.

— The /24 is the RVR or controlling visibility factor when reported for this runway. (RVR will be discussed in a subsequent paragraph.)

— The 200 is the HAT, or height above touchdown. This indicates that although the field elevation is 824, the elevation at the end of the runway (touchdown) is 823 because the DH is shown as 1023. The figure is published to assist the pilot in interpreting the approach plate.

— The figures (200-½) are the minimums for the approach. These figures are used as the basis for determining if existing and forecast weather will permit use of the airfield as a destination and for determining whether an alternate is required.

For a straight-in ILS approach without glide slope, an ADF approach, and a circling, a different set of figures is published. Note that for circling the minima vary for different categories of aircraft. Considering the ADF approach, again for categories A through D: S-NDB-23R 1340-1 516 (600-1)

— 1340 is the MDA, minimum descent altitude. DH is used only for precision approaches. MDA is the lowest altitude to which descent shall be authorized in procedures not using a glide slope, unless the runway environment is in sight and the aircraft is in a position to descend for a normal landing.

— The visibility (-1), however, is 1 mile and RVR is not authorized for this type of approach, although it is a straight-in approach to a runway with RVR. By its very nature, RVR is never authorized on a circling approach.

— 516 is the HAA or height above aerodrome. HAT is applicable to precision approaches only. The HAA is the actual height of the MDA above the field which, because of TERPs criteria, is often less than the published minima.

— (600-1) represents the minimums for planning purposes.

The new approach plate also includes runway lighting information in the block depicting the field. HIRL in the example (and found in the legend for instrument approach procedures) stands for high intensity runway lights. The circled V symbolizes visual approach slope indicator and the circled A_1 is the symbol for U. S. standard (A) lighting system. For further information see the inside back cover of any low altitude instrument approach procedure volume.

There are several other minor changes in format which are self-explanatory.

In addition to the new format for approach plates, TERPs has introduced RVR which is discussed in the new AR 95-2. RVR information is determined electronically by a device known as a transmisometer which measures visibility down the runway in feet. It is an instantaneous reading and cannot be forecast.

RVR is never used in conjunction with a circling approach. RVR is the controlling visibility factor when published and reported for a given runway.

When RVR is published as a minimum, but not reported, the required RVR may be converted to equivalent visibility in accordance with the table below and substituted as the applicable visibility minima.

1600 — ¼
2000 — ⅜
2400 — ½
3200 — ⅝
4000 — ¾
4500 — ⅞
5000 — 1 s. m.
6000 — 1¼

An example of RVR terminology could be "measured ceiling 400 overcast, visibility ¾. Runway 6 visual range 4000."

This brings us to the new AR 95-2 which, in its eight pages, contains more significant changes to accepted instrument flying procedures than any other document in recent years.

Paragraph 3-9 *b*- ". . . Helicopters are authorized to use the lowest approach category minima and may reduce the published visibility or RVR by as much as 50% but never to less than one-

quarter mile or RVR 1600′."

As long as the legend of the approach procedures volumes indicates that sliding scale is still applicable to U. S. Army, this reduction in visibility may be used in conjunction with sliding scale. Sliding scale is not a part of TERPs and will eventually be removed from all approach plates as TERPs spreads to all civilian fields.

The reduction in visibility may be used for planning by helicopter pilots to determine suitability of a field as a destination, the need for an alternate, suitability as an alternate, and as the basis for commencing an approach. An example of this would be minimums for helicopters of 200-¼ for precision approaches. No provision is now made permitting helicopter pilots with special instrument cards to descend 100 feet below minimums.

Paragraph 3-9 *f*- "Takeoff minima for those aviators possessing the appropriate Army instrument qualification when operating aircraft in which they are qualified are —

"(1) Standard Airplane Certificate — Ceiling 200′, visibility, one-half mile or RVR 2400′, for operation of fixed wing aircraft.

"(2) Standard Helicopter Certificates — Ceiling 100′, visibility, one-quarter mile or RVR 1600′, for operation of rotary wing aircraft.

"(3) Special Airplane or Helicopter Certificate—No minima apply. *The nature and urgency of the mission along with the inherent risk should be considered when exercising this flight clearance authority.*" [Italics ours]

Paragraph 3-9 *g* (1) — "A *straight-in* approach may be initiated if the visibility or RVR is reported to be at or greater than that published. . . ." Note, nothing is said about ceiling. The pilot cannot descend below the appropriate MDA or DH unless he establishes visual contact with the runway environment and can land from his position.

Paragraph 3-9 *g* (3) — "If upon arrival at the destination airfield, the required minima do not exist, a pilot may not commence approach. He may request ATC instructions to hold if the forecast is favorable and all alternate airfield requirements can continue to be met."

Paragraph 3-10 — Alternate airfield.

"*a.* An alternate airfield is required if the weather conditions at the destination airfield of an instrument flight plan is forecast to be less than the following during the period from one hour before until one hour after the ETA:

"(1) *Airplanes.*

(a) Ceiling — 3,000 feet above the appropriate landing minimum.

(b) Visibility — 3 miles or 1 mile more than the appropriate landing minimum, whichever is greater.

"(2) *Helicopters.*

(a) Ceiling — 1,000 feet above the appropriate landing minimum.

(b) Visibility — 2 miles or published minimum, whichever is greater.

"*b.* An airfield will not be listed as an alternate unless current weather forecasts indicate that the ceiling and visibility at the alternate airfield will be at or greater than the following during the period from one hour before until one hour after ETA."

(1) Airfields for which an instrument procedure or radar minimum is provided in the DOD FLIP.

(a) Airplanes—Ceiling and visibility at or greater than alternate minimum specified in DOD FLIP publications.

(b) Helicopters — Same as (a) above except that visibility may be reduced by 50 percent.

(2) Instrument procedures not published in the DOD FLIP or for which alternate minima are not specified:

"*(a)* Airplanes — Ceiling 400 feet above the appropriate approach minima; and visibility 1½ miles above the appropriate published minima.

"*(b)* Helicopters — same as (a) above except that the derived visibility may be reduced by 50%.

(3) Airfields without an instrument approach.

"*(a)* Airplanes—Conditions which permit VFR descent, approach and landing, with visibility of not less than 3 miles.

"*(b)* Helicopters — Same as (a) above except that visibility may be reduced by 50%."

Paragraph 3-12 Copilot requirements. "A copilot is required into known or forecast instrument conditions."

"a. *Helicopter flight.* The copilot must be helicopter instrument rated and qualified in the aircraft being flown."

"b. *Airplane flight.* Commanders will consider pilot proficiency, mission requirements, and area of operation in determining qualifications required for fixed wing copilots. The use of an instrument rated copilot is encouraged for flights originating or terminating in areas of high density air traffic. In this connection, special consideration will be given to major terminals included in the DOD FLIP area charts coverage."

It is not intended to imply that this article contains all the recent changes to instrument flying procedures; rather it attempts to cover the most significant changes. It is hoped that it will cause all aviators to fully use the annual written examination study guide, which is prepared for their benefit, before taking the exam in the future. It is hoped, also, that it will provide you with the basis to provide your own answer when someone asks you "What's New?"

The success of the airmobile concept in Vietnam is in large part due to outstanding maintenance support. A significant portion is provided by the 34th Group which supports all Army aircraft in Vietnam

We Keep Them Flying

Lieutenant Vincent R. Guerrieri

I WAS SITTING in the Saigon heliport, writing a letter while waiting for a ride to Vung Tau, when somebody tapped me on my shoulder. Turning around, I almost fell out of my chair, for there behind me was one of my best friends from college.

"Mike, what in the world are you doing here?" I said, really more from surprise than question since I noticed the Medical Service Corps brass on his collar.

"I'm running a dispensary out at Long Binh," was his reply. "I see you're in the Signal Corps, but that patch you are wearing says 34th General Support Group. What kind of an outfit is that?"

Here there was a lull in the conversation as our voices were drowned out by the whispering, yet somehow thunderous, "whop, whop" rotor bang of a Chinook making its approach. We paused to watch the lumbering giant, hauling a Huey B model on a sling, deposit its cargo in a corner of the heliport, hover for a few seconds, then silently head off in the direction from which it came.

Do you mean you've never heard of the 34th General Support Group (AM&S)?" I asked.

"No."

"Well, let's sit down and I'll tell you all about the most important support unit in the entire war."

"You have to be talking about the medics, right?"

LT Guerrieri wrote his description of the unique and important operation of the 34th General Support Group while assigned to that unit. Because the 34th has such extensive responsibility for aviation in Vietnam and some unique operations, he felt it would be of interest to all.

"Of course the medics are vitally important, but I'm talking about the concept of airmobility, a really important factor in this war. Surely you'll agree that without the helicopter we would be in no better position than the French were back in the early '50s."

"Yes, you're right there, Vince."

"OK, to start with, let me tell you that 'AM&S' means Aircraft Maintenance and Supply. The 34th Group has the responsibility of supporting all Army aircraft in Vietnam with maintenance, supply, and depot level component repair for the entire aircraft. It means just that—including airframe and powerplant, armament and avionics. And we do it in a way to provide the fastest possible support to the combat aviation units: with one-stop service.

"This all means that if the Army flies it in Vietnam, the 34th Group either fixes it, gets the parts for it, sends it back to CONUS for overhaul, or brings it into the country—anything that has to do with Army aviation maintenance and supply."

"Sounds like a pretty big job. How do you do it?"

"We do it with the only aircraft maintenance and supply group in the U.S. Army. The 34th Group was designed and built in the combat zone of Vietnam to provide the support required by the counter-insurgency operation. And you're right, it is a big job. Over 25 percent of all aircraft in the Army inventory are here in Vietnam.

"What we've done is locate the maintenance units right with the concentrations of aircraft and maintain a centrally located depot for repair parts. This is why we have our 765th Transportation Battalion located at Vung Tau, the 520th at Phu Loi, the 14th at Nha Trang and the parts depot, which we call the Aviation Materiel Management Center, operated by the 58th Battalion, at Tan Son Nhut.

"We also have operational control of the floating aircraft maintenance facility. It is operated by the First Transportation Battalion aboard the *USNS Corpus Christi Bay* and has the mission of performing limited depot level component repair. Each maintenance battalion has located its companies right with the customer units. For example, the 14th Battalion is headquartered in Nha Trang, but the 339th Transportation Company is located at Phu Hiep, the 608th at Dong Ba Thin, the 335th is at Chu Lai, the 79th and 540th at Qui Nhon, the 610th at An Khe and the 604th at Pleiku. These units can, through their location, provide the best possible support."

"Say, what's this 'one-stop service' you were talking about?"

"It is about the best thing that Army aviators could have asked for. Remember, I told you we maintain armament, avionics, airframe and powerplant. Well, when we get a ship which needs extensive maintenance, it usually requires maintenance on more than one of the major areas of the aircraft.

"See that Huey in the corner just dropped off by the Chinook? It has some fairly extensive crash damage. See how the mast is tilted? That means it will probably need some work on the engine and transmission, rotor head and blades. That mangled door, hanging by a single hinge, will be replaced. See how the nose of the ship is damaged? Well, right behind there is a maze of very delicate electronics equipment that will surely need some looking after. I can't see from here how much damage was done to the guns, but you can bet they'll

Armament specialists check and repair gun systems

Did you see how the Chinook brought that Huey in? . . . there's a lot more to it than just going out and attaching a hook to the helicopter and hauling it back

probably need some work in the armament shop.

"Now, if we didn't have one-stop service, you can never tell when it might be repaired. After inspection, that bird will be brought into the shop right here, and teams of experienced, school trained mechanics will get to work on her. The avionics people will make a thorough check of the avionics gear and remove all inoperable equipment, repair it and get it back in the ship as fast as possible. At the same time, the sheetmetal workers will set to the task of patching the holes, replacing doors, or whatever else is required to make the body airworthy again. While this is going on, the armament specialists are making checks and repairs on the gun systems, repairing the defective items they come across and replacing those that cannot be repaired. All the engine and transmission work will also be handled right here, while the other systems of the aircraft are being repaired.

"You can't get service like this on your car back home! And it doesn't happen by accident. Each of these companies is designed with this one-stop capability in mind. Can you picture how the process would be if the engine was repaired here, then the ship was hauled to Vung Tau to repair the avionics equipment, then go to Phu Loi for maintenance on the armament subsystem? It sure wouldn't get the aircraft back into service very quickly."

"This one-stop service seems to be a solution to the problem of getting the helicopter in the air as quickly as possible. But how do you get them back from the field so you can fix them?"

"All in a day's work. Each of the battalions, as well as several aviation units, has a recovery and evacuation mission. This means that they go out to the site of the downed aircraft and physically bring it back. Did you see how the Chinook brought that Huey in? Well, there is a lot more to it than just going out there and attaching a hook to the helicopter and then hauling it back.

"Before that Chinook was even in the air, a recovery team was on the site inspecting and rigging the aircraft, that is, preparing it for the CH-47 to come in and pull it out. Many times they must secure the area where a bird goes down and work under fire. There have even been times when a crew has gone out and changed an engine right where the chopper went down. And by the way, our mission isn't limited to helicopters only. We are responsible for all Army aircraft. So that means if a Mohawk or Otter goes down, we go out, bring it back and put it in shape again."

"Very interesting, what about . . . say, you said maintenance and supply, and you haven't mentioned a thing about supply. Is that just a minor part of your operation?"

"Definitely not! Supply is every bit as important as maintenance. Without supply there can be no maintenance, and in an area where so many specialized parts are needed to keep the equipment operational, we must emphasize it that much more. We have a whole battalion that has sole responsibility for stocking repair parts and getting them to the maintenance units—fast!

"The Aviation Materiel Management Center is located at Tan Son Nhut and is operated by the 58th

Transportation Battalion. With an operation as large and complicated as they have, I can't hope to fully explain it, but I can tell you that they do a bang-up job. Every week, tons of aircraft parts arrive at the AMMC from CONUS by air. These parts must be accounted for, placed into stock, stored and shipped out to the maintenance units. This requires vast warehouse space and more computer equipment than you would think.

"The parts are shipped through the 'Freddy the Freeloader' system. The 'Freeloader' system consists of a really excellent working agreement whereby the Air Force provides two C-123s each day. Those planes are loaded to capacity with parts needed by the units up country. Priority requisitions—all of our Red Ball and EDP items go by Freeloader. . . ."

"Wait a minute, what is Red Ball and what is EDP?"

"You remember the famous 'Red Ball Express' initiated during World War II to bring gas to Patton's tanks, and how it grew to be such a big thing? It eventually wound up hauling rations, ammunition—anything urgently needed at the front. Well, the Red Ball I'm talking about is the same as this, only now, instead of using trucks, we are using aircraft, jets if we can. We use the Red Ball to get items that are immediately needed to get an airplane back in the air, whether the part is required from the AMMC or from CONUS.

"When the equipment is deadlined for parts, or EDP, it means that the mechanics can fix it but they don't have the repair part. We strive to prevent this, and with the Red Ball Express we have greatly reduced the number of EDPs. This has increased the availability of Army aircraft in country to a point which is, in many cases, higher than the worldwide Department of the Army standards."

"That sounds good. You must have a bunch of topnotch people working in your outfit."

"Right, and the commander is well aware of this. He obviously recognizes the wealth of talent and skill in the subordinate units by his command policies. The Group Headquarters provides only policy guidance with minimal restriction on initiative. And this policy has worked extremely well in allowing the men in the units to shine. Last year when the command of two of our battalions, the 14th and the 58th, changed hands, both of the commanders received the Legion of Merit for the fine job they did while in command. They didn't get these awards for nothing, but they didn't do it alone. Both of these commanders praised their subordinates 'down to the man who turns the wrench' for their excellent work in keeping the aircraft availability so high."

"Just what kind of training do your people have?"

"We have men of just about any MOS you would think of and some you wouldn't. From single-engine helicopter mechanics, fixed wing mechanics, avionics repairmen, aircraft armament repairmen, ground control and surveillance radar repairmen, aircraft repair parts supply, avionics supply and armament supply specialists to Engineer equipment repairmen, crane and shovel operators, legal clerks, communications specialists, finance clerks, ADPS operators and repairmen, and even a draftsman are just some of the jobs in the Group.

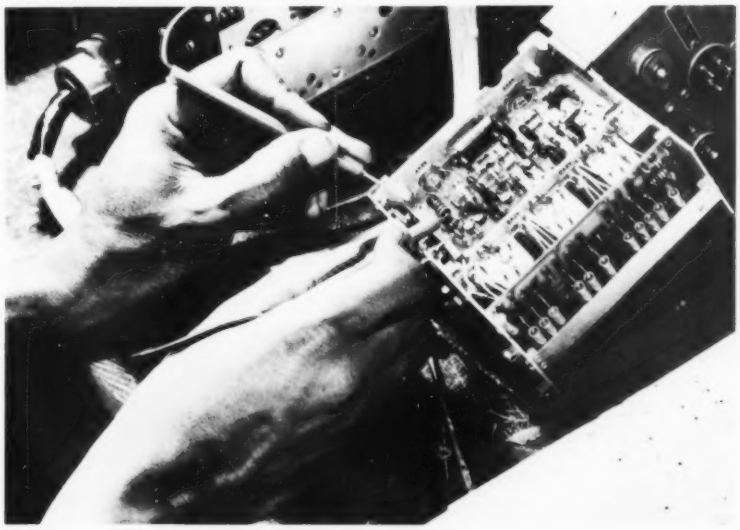
"And all of these people are school trained, with the mechanics receiving additional familiarization training at our school in Vung Tau. The officer MOSs are not so diverse. Most officers in the Group carry a maintenance MOS such as aircraft maintenance, armament or avionics. Of course there are those necessary administrative, plans and operations people. All of these people contribute to keeping the Group operating efficiently."

"What about you, Vince? What is your job?"

"I'm the PIO."

"I should have guessed. . . . Say, do you remember that Halloween party we threw back in 1964? Remember that picture you took of. . . ."

34th Group personnel range from clerks through skilled technicians, such as below, where a specialist works on omni equipment



The Flight Chaplain

Is there a real need for a "flight chaplain" with all that the term implies in training, pay, insignia, and specialization? . . . I feel we have a problem in this area

Chaplain (Major) Robert G. Swager

TWO YEARS AGO the first chaplains were assigned to Army aviation units in Vietnam. Army aviation was becoming an essential part of the United States Army's tactical operations. As the months in Vietnam went on, Army aviation grew from detachments and companies to battalions and groups and finally to the 1st Aviation Brigade. With this growth came the assignment of five chap-

lains in 1965, and with this assignment of chaplains to aviation came a problem of their status, training, and service.

Let us consider the problem of the essential training and preparation that a chaplain ought to have to serve most effectively in an aviation assignment. The problem is obviously twofold. On one hand we have the problem of the chaplain's service in the aviation unit. On the other hand we have the concern to place the chaplain in a more realistic status in relation to other members of the aviation unit.

Basically I am asking: Is there a real need for a "flight chaplain" with all that the term implies in training, pay, insignia, and specialization?

After a year of personal experience with an aviation battalion in Vietnam and after querying several other chaplains similarly assigned, I feel we do have a problem in this area. Army aviation is a specialization that sets one apart as especially trained and belonging to what has been referred to as "the flight fraternity."

In the subsequent paragraphs I shall outline what bearing this training and attitude has on the chaplain and on the fulfillment of his mission within the command. Bear in mind that most, but not all, of the disadvantages accruing to the chaplain under the present system can be and are overcome by individual chaplains after a period of service with aviation. However, that is a long and expensive way to prepare for an assignment.

First, let us think briefly about the initial impression that the new and untrained chaplain makes in an aviation unit. For the members of an aviation unit there is a social milieu that goes beyond the rank and position structure of the military. Men are not only looked upon in terms of rank or grade but perhaps even more in terms of aviation related proficiency. Added to this aviation oriented rating system we have the whole spectrum of stories, terms, traditions, psychological "mind set," and acquaintances that provide a full-blown social structure and value system.

It is precisely here that the chaplain meets his first problem. The value system in this type of organization says that to be in aviation is a "value," to be outside it is to be "valueless." The current system assigns a chaplain to the unit and he is an outsider.

Second, we can turn our attention to some rather practical and more tangible considerations. Chaplains who are currently serving with aviation or have served in the very recent past noted their needs: familiarity with types and capabilities of men and machines, radio procedures, aviation terminology, area of safety, and operational procedures for various types of missions. To supply these needs, some sort of aviation training is real and urgent, according to some chaplains who have served in this new and growing field.

Whenever a problem arises and a solution is sought, we do well to see if there is a precedent. Army aviation of the type we have today might be quite new, but the chaplain given specialty training or specialty badges is not new. The jump qualified chaplain immediately comes to mind—undergoing a short training period, being engaged in a specialized military operation with his unit, drawing extra pay, and wearing a distinctive insignia.

Now largely forgotten is the World War II glider, but it should be remembered that some chaplains were trained for service with those units and earned wings as glider pilots.

With "wings," the chaplain may not be looked at as an outsider

MAJ Swager, an aviation chaplain, tells of the unique situations and responsibilities of such an assignment. He also recommends "wings" for chaplains and justifies this by pointing out the history of specialized chaplains who have undergone training similar to that of the men with whom they serve.

The Flight Chaplain

More nearly analogous to the current situation is the problem of the Army Air Forces of World War II. "Like the cavalry of earlier times but to a greater degree, service in the air involved sudden dangers, swift action, instant decisions, dash and daring. The unpredictable factors bred fatalism in some and recklessness in others. To meet them on a ground of common understanding a chaplain must be able to recognize these facts and their implications."[1]

It appears that Army aviation faces the same problem again, 25 years later. To solve the problem of the chaplain with aviation the following solution was used: "Different combat arms have distinctive psychological problems which affect the chaplain's work. This is especially true of the Air Force, where fighting conditions sometimes tend toward recklessness or a degree of fatalism. The intensive program of the Chaplain School allowed little time for a study of these matters. This was considered so important that the Air Force opened its own school at San Antonio, Texas, in June 1944 to give two weeks of special training to graduates of the other school who had been selected for duty with air personnel. . . ."[2]

The Chaplain Branch has long trained chaplains for specialized assignments in hospital and prison work and as instructors. Briefly stated then, we in the Army Chaplaincy have a long tradition of specialized training and have recognized its value to fulfill assignments with specialized units.

If we have a problem and if training will do a great deal to solve the problem, what solutions are open to us? It seems to me that there are basically three solutions.

First, this could be handled internally as a branch matter. It would mean that an orientation course could be given as a classroom presentation at the U. S. Army Chaplain School at Fort Hamilton, N. Y. There are certain advantages in that chaplains already at the school for either the basic or advanced courses could be held over for an additional 10 days or 2 weeks to receive the training. This plan has several obvious disadvantages that can be readily recognized by the reader.

Second is the program similar to the orientation course for Army flight surgeons at the Army Aviation School at Fort Rucker, Ala. It is interesting to note that the Army has several systems for training flight surgeons. One of these programs lends itself particularly well for use by a small, selected group of chaplains. Those flight surgeons trained by the Air Force for the Army, following their Air Force training, go to Fort Rucker for 2½ weeks of orientation. This group could accommodate chaplains for the orientation phase of their training, thus relieving any extra scheduling problems. This arrangement might have some travel and TDY costs involved but it would appear that it would provide outstanding training.

Third and finally, we have the choice of full flight training. This training is long, expensive, and does not fit the mission of the chaplain. The Army Chaplaincy does have chaplains who are pilots, and these men might well be assigned as flight chaplains and be allowed to stay current. Such men would meet all criteria for a flight chaplain but their numbers are too few even to fill current aviation needs.

It would appear that a flight surgeon type orientation program is the most desirable solution. Therefore, here is the recommendation. Many chaplains who have been actively involved in Army aviation recommend that an orientation program leading to qualification for specialty insignia, pay, and assignment should be instituted. It would seem to be advisable to give the chaplain his flight orientation at Fort Rucker in conjunction with the Air Force trained surgeons. During those periods of instruction on medical records and administration the chaplains could meet for seminars and instruction with an aviation experienced chaplain.

In this arrangement the chaplain would receive the best possible training in the emotional mind-set of the men who serve in Army aviation. By this method he could gain an appreciation not only of the aviator's emotional but also his physical limitations. Then he would be in a position to work and speak more meaningfully to the aviation unit.

Tied in with the emphasis on the man is the need to understand the aviation unit's mission, uses, and tactics because to serve the unit and the men in it is the chaplain's concern and duty. Where pilot error, worry, and strain affect the life and safety of all those on the aircraft, it behooves the chaplain to render the most effective ministry possible.

The flight chaplain orientation program should teach the chaplain those skills and that knowledge necessary to handle himself in such a manner that will commend him and what he represents to the men. The orientation program should include a liberal "dose" of aviation safety. Add to aviation psychology, tactics and safety such things as history, terminology, nomenclature, and organization and you have qualified a chaplain who can go to an aviation unit better prepared to render finer service than ever before.

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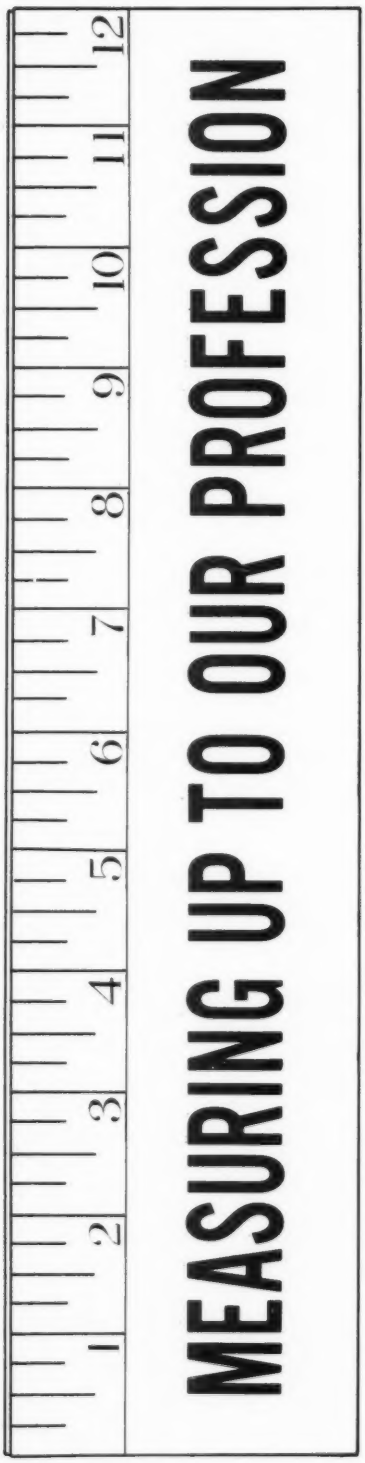
[1]Honeywell, Roy J., Chaplains of the United States Army, Office of the Chief of Chaplains, Department of the Army, 1958, p. 231.
[2]Ibid., p. 250.



Traits or items that make an aviator's performance professional are quite subtle and basic. Let's just see how basic . . .

Captain Ronald J. Piche

LET'S CONSIDER some traits that distinguish between the professional and the nonprofessional Army aviator. The distinction can be made only by observing how the aviator applies his knowledge and training. Many of the traits or items that make an aviator's performance professional are quite subtle and rather basic. So now let's just see how basic these things are and what we should do to ensure ourselves and others that we haven't slipped into a nonprofessional category.

Personal Appearance—One evening several months ago, I was filing for a night flight at operations when two other pilots entered. Their flight suits had not seen the inside of a washing machine for an obviously long time. It did not require a sharp eye to see that one of the pilots was wearing civilian shoes, and the other displayed a portion of a sport shirt collar sticking up from under his flight suit. Besides violating the uniform regulations, these two individuals impressed me with a complete lack of personal pride and discipline, which in turn indicated a nonprofessional attitude towards flying.

Let's follow the example set by the guy who always presents a neat, clean appearance and wears the proper uniform. It doesn't require much extra effort on our part. Granted, when operating in the field for extended periods of time, it isn't always possible to keep up our appearance; however, the effort should be made. Remember, when we fly in and out of military and civilian airfields, we are giving an impression of Army aviation to members of other services and civilians.

Courtesy—How often have you been blasted with sand, dust, and even small stones by a pilot who didn't have enough courtesy to turn the nose of his aircraft while making a runup? This is very irritating, as is being cut out of the pattern or being forced to make a go-around because of the guy who takes his good sweet time clearing the active.

A few days ago, while filling out the book in a helicopter with the rotor blades slowly turning down, another aircraft hovered in beside me to park, causing all kinds of wild gyrations upon the rotor head not to mention my being shaken halfway out of the cockpit. There were many other parking spots to choose from but he just wasn't thinking. Besides being thoughtless, these acts can cause injury to personnel and damage to other aircraft.

Emergencies—Think back to primary flight school when it was required to have a forced landing area in sight at all times. If we didn't the IP simply closed the throttle to simulate a forced landing, and we suddenly found ourselves in a most interesting situation. Do you know pilots who have become "too experienced" to bother with maintaining this type of vigilance? If we become complacent about the importance of these

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CPT Piche, realizing the importance of true professionalism in Army aviation, selected his topic in hope that a review of the basic elements of professionalism will serve as a reminder of its role. To be effective they must be practiced daily.

things that were required of us and taught in flight school, it's safe to assume that we regard all regulations, policies, and procedures with the same complacency.

If we aren't prepared to handle emergencies such as forced landings, it's reasonable to assume that other inflight emergencies could end in disastrous, if not fatal results. Think of the accidents in the history of aviation that could have been avoided by simple familiarization with emergency techniques, clearing procedures, and a good professional attitude towards flying.

It was required in flight school, and we should demand it of ourselves today. There are, in fact, some of us who have aft-section scar tissue as a result of a few forgetful moments with our IP. Let's review the emergency procedures for each aircraft we're qualified to fly. It's not very time consuming to periodically open a — 10 and scan the emergency section to refresh the memory. We should be prepared to handle any emergency that might arise. The investment of those few moments pays big dividends.

Radio Procedures—This is probably the most abused facet of aviation. There are proper procedures and phraseology to be used in voice transmissions, but volumes could be written on improper and excess verbiage that is heard over the air every day. We should pause and think of what we're going to say before we press the button to talk. For example, when calling in information from a reconnaissance mission, it's a good idea to write down what we want to say beforehand. Then when we transmit we're able to give a brief but clear report without pausing with a dozen "Ahs" while we're trying to remember exactly what we wanted to say.

Few things are more irritating than finding the air clogged with unnecessarily prolonged transmissions when we're waiting to transmit some important information such as an IFR position report. Several other items to keep in mind are to listen before we transmit to prevent interrupting and cutting out other transmitting parties and to give the traffic controller a break. His job is to assist the aviator. Don't make it harder for him by using inaccurate and improper radio procedures just because you think it sounds "cool."

Pilot and Aircrew Checklists — Here is an area in which many of us compromise ourselves to expedite a mission. Paragraph 18, AR 95-4 states: "The hazards inherent in inadequate preflight, takeoff, and landing procedures require that special attention be given to the use of pilot and aircrew checklists." Is this a sound statement? You bet your life it is! Then why is it that so many of us carry our checklists with us but never bother to use them? Naturally, if we fly the same aircraft day in and day out, we've probably memorized the checklist. Let's consider paragraph 19b and c of AR 95-4 which states: "Crewmembers accomplish verbal callout and confirmation of checklist items" and "Crewmembers *do not* memorize checklists and rely on memory for the accomplishment of prescribed operational procedures."

Suppose we're qualified in several aircraft which we fly infrequently or we have a desk job and just squeeze in 4 hours a month? Then it is imperative that we use a checklist to ensure that all components of the aircraft are safe for flight. Why should we put our lives on the line by assuming all systems are functional? A flight could end in disaster by simply omitting one item on a checklist.

Some aviators feel embarrassed if others see them using a checklist. Isn't it more embarrassing to start an aircraft with the rotor blade tied down? Imagine the embarrassment of the pilot who takes off to a hover and discovers he

Embarrassing? Ask any pilot who has landed gear up

failed to release the cyclic friction. Don't restrict the use of a checklist to preflight and takeoff checks. Prelanding checks are equally important. If you don't believe so, just ask any pilot who has made a landing with the gear up. A simple prelanding check will help prevent such needless accidents.

Proficiency—Some of us interpret proficiency to mean flying 4 hours a month for flight pay. Are we actually accomplishing anything toward maintaining our proficiency by flying straight and level to a point B or flying circles to log time? Staying proficient involves more than getting the aircraft started and "breaking the surly bonds of earth." File IFR and practice a few approaches. Dig in and review a standardization guide. Work on maneuvers that have given you trouble in the past. Shooting a normal approach by the book can be very revealing if this maneuver hasn't been practiced for some time. This is the type of proficiency that counts and pays off when the chips are down.

Control Touch — In this area most of us feel that a pilot exhibits his true professionalism. It appears basic enough to fly from point A to point B and arrive safely. All Army aviators have this capability, so how do we distinguish the real professional aviator from the amateurs on such matters? The professional has a definite purpose in mind and keeps well ahead of the aircraft. For example, he will not compromise himself on altitude. If he begins to inadvertently descend from his assigned altitude, he immediately applies a correction and continues the application until he has the altimeter reading the exact assigned altitude, not 50 feet above or below.

When flying a particular heading he will maintain this heading, not two or three degrees left or right. Those of us who have flown with the guy who bruises your knees with the cyclic stick and flies as if he were in a thunderstorm have seen the extreme end of the spectrum. Let's keep ourselves on the opposite end of the spectrum by flying the aircraft as it should be flown. There is a big difference between herding an aircraft through the sky and flying it.

Physical Fitness—Army aviators who eat in messhalls have no problem availing themselves of a balanced diet. It's there for them if they want to eat it. The problem seems to be overeating! Overweight is incompatible with peak efficiency. For instance, being overweight not only holds up passing your flight physical, it can make you more susceptible to illness and fatigue. Keeping our weight down not only makes us feel better but we also look better. Needless to say, if you are going to diet, do so under the supervision of your flight surgeon. Drastic unsupervised crash diets have been reported in connection with several Army aviation accidents.

Every aviator should have some sort of physical fitness program set up for himself. Regular exercise increases your feeling of well-being and promotes stamina and endurance. In addition, recreational exercise relieves nervous tension and mental fatigue. Physical fitness is important to everyone in all walks of life, but to none is it more important than to the Army aviator and aircrewman. Good muscle tone, endurance, stamina and self-confidence generated by good physical condition are vital to the professional aviator.

These are just a few of the many ways we can measure up to professionalism. We should strive to attain these goals every hour of every day. Let's take pride in ourselves and our profession.

Aviators should have their own physical fitness programs

Get Homeitis

. . . I was on the gauges and starting an immediate climb. With all those mountains around, I wasn't about to continue the letdown

Major Paul R. Riley, Jr.

IT WAS A TYPICAL summer evening in Korea, clear skies, calm winds, high temperature and humidity. Ed and I, both assigned to a staff job while pulling our tour of ground duty, had decided that this would be a fine night to get some of our minimums out of the way. That afternoon we had called and scheduled a U-6 for a night cross-country from Uijongbu to Kunsan and return. We planned to depart at dark and return around midnight. Two friends of ours from the battalion staff, not rated aviators, had asked to go along for the ride. We told them we would be glad to have them.

We arrived at the airfield around 1930. While Ed went out to preflight the aircraft, I went to operations to check weather and file our flight plan. Camp Red Cloud had no forecaster stationed there, but an observer team was on duty. The observer team also had a teletype which brought in the forecast for the area from Air Force weather at Kimpo.

In checking the forecast, I noted there was a possibility of some light ground fog after midnight. I asked the observer what his temperature—dewpoint spread was and he said about 15°. Based on the forecast and what the observer had told me, I decided that we could make our round robin and be back in at our home field long before any fog could form. I didn't know it at the time, but this was my first mistake.

I filed our flight plan and went out to the aircraft. Ed had completed the preflight and was briefing our passengers on emergency procedures and the use of the parachute. After he finished his briefing, I discussed the weather with him and we agreed that we would have no problem in getting home. Ed had mentioned that the rear tank on our Beaver was empty. It was standard practice to fill only the front and center tanks on the Beavers, since they often had to operate out of short strips and the reduced fuel load allowed them to carry a greater amount of cargo. We discussed whether we should have the rear tank filled, but since it was a fairly short flight we finally decided that we could [illegible]

extra fuel. Also, we planned to fly at 7,500 feet and by leaning out the mixture would have plenty of fuel. This was mistake number two.

Since I had an instrument check-ride coming up in about a week, Ed told me to go ahead and fly in the left seat. I could practice ADF tracking and get in an approach at Kunsan. We decided to fly to the NDB at Seoul, then direct Pyongtaek direct Kunsan. We would shoot one approach to Kunsan and then return by the same route to Uijongbu.

The ship checked out fine on runup and we were off the ground at about 2045. As we climbed above the mountaintops around Camp Red Cloud and turned south toward Seoul, I looked out to the west and saw a large bank of fog moving in from the sea. Neither Ed nor I were concerned, however, we were sure that the 3,000-foot mountains would stop that fog from moving into the valley around Uijongbu. The fact that it would close Kimpo Air Base never entered our minds.

The flight south was uneventful. The air was perfectly smooth and the sky was clear, with a million stars shining brightly. With the aircraft trimmed up, we both relaxed and enjoyed the flight. About 20 miles north of Kunsan, we called the tower and requested a practice ADF approach. Kunsan tower answered that we were cleared for a practice approach and to remain VFR. They advised that numerous jet aircraft were also practicing approaches and that their radar was down for maintenance.

We didn't even hesitate. We told them thank you anyway, but we just decided we didn't care to get into traffic with jets in our 105-knot Beaver. We said we were reversing course and returning to our home base. Without the radar to keep us advised of that jet traffic there was

MAJ Riley, like the popular "cure all" that fizzes in water has invented a disease and offers his prescription for preventative medicine. Since all of us are prone to want to get home after a long, tiring trip, his preventative medicine should be in all pilots' medicine cabinets.

Get Homeitis

too good a chance to get run over by big brother.

As we completed our turn and headed north, I reached down and switched to the front tank. The center tank indicated about 4 gallons remaining. On crossing the NDB at Seoul, we could see the lights of the city. They looked kind of fuzzy, and I commented to Ed that there was sure a lot of haze around the city. He agreed.

We started our descent as we entered the valley north of the city. We could see the lights of vehicles moving north along the highway which goes from Seoul to Uijongbu. We were just about home.

Passing through 4,000 feet, I suddenly lost visual contact with the ground. It only lasted for a moment and we were in the clear again. Hmmm, I thought, must be a few small clouds around. As we passed 3,500 feet, without warning we were in it. Solid, impenetrable. I yelled at Ed that I was on the gauges and starting an immediate climb. With all those mountains around, I wasn't about to continue the letdown.

Ed called the tower at Red Cloud and requested their weather. They said the field was clear, but all around they could see fog and clouds on the sides of the hills. The valley to the south had some stratus in it but looked like good visibility underneath.

As we broke out on top again, Ed called Kimpo. They were socked in completely with fog. Seoul reported they were open but didn't know for how long.

By this time our fuel was running low. We decided to try for Seoul. We headed south, hit the beacon, and turned inbound on final. The tower cleared us straight-in. As we crossed the Han River, we were in and out of patchy fog. Touchdown and rollout were normal and we taxied in to the ramp.

While Ed made arrangements for fuel, I went to operations and called Red Cloud. I got in touch with one of the pilots of the aviation section and asked him to check the weather there for me. In a few minutes he was back on the phone and said the field was wide open. I explained what happened and that we might not get back that night. He said that it was our decision. I thanked him and hung up.

When Ed came into operations, I told him about the phone call. We talked it over and decided that if we flew up the valley, we could stay under any clouds and make it in. By following the road we would avoid any hills. Not wanting to spend the night in Seoul, we decided to try it. Mistake number three.

I yelled for Ed to bring up the flaps. As he did, the aircraft lost lift and dropped to the pavement . . . traveling much too fast

The field was still VFR as we took off and headed out over the city. We stayed at 1,200 feet and turned north up the valley. The lights of the cars on the highways were visible and it seemed that we would have no problem. Then we started to hit some patchy stratus coming off the hills. We could still see the highway and the lights of Uijongbu were visible, so we continued.

About 5 miles out we called the tower and requested an extended left base for runway 27. I had no intention of trying for 09, the active, as the traffic pattern for it would put me close to the hills. Also, I wanted to keep those lights in sight. The tower cleared us as requested and we began our approach.

As we turned final and lined up on the lights, I came back on power and Ed lowered the flaps to the takeoff position. Suddenly, at about ¼ mile final, we went into a patch of fog. We lost all forward visibility. I slammed in power and started a climb. Then we popped out and the runway was right in front of us. Off came the power as we crossed the fence on the end of the runway.

With the added power, airspeed was high and as we rounded out, the aircraft started to float, airspeed dropping off, but much too slowly. We were in a three-point attitude about 6 inches off the ground. I yelled for Ed to bring up the flaps. As he did, the aircraft lost lift and dropped to the pavement, touching down at about the halfway point, but much too fast. We both pulled back on the yoke and stood on the brakes. The aircraft finally stopped about 50 feet from the fence at the far end. We taxied to the ramp and shut down.

As we climbed out, one of our passengers said, "Thanks for the ride. You guys sure have it soft, getting paid for an easy job like flying." Ed and I looked at each other and smiled rather weakly. We didn't bother to answer.

I learned a number of things from this flight. First, don't try to second guess the weather. Be sure of it before departing and check it continually while inflight. Second, be sure you have adequate fuel on board. If we had filled the rear tanks before departing, we would have had an adequate reserve of fuel to take us to a field which was not having any weather problems. As it was, we were lucky at Seoul. Third, and most important, when in doubt, DON'T. Get-Homeitis can kill you.

VIEWS FROM READERS

Sir:

Major Chapman C. Norton's article "Togetherness" in the Feb 68 issue of the Digest appears to be a little one-sided. As a dual rated aviator, I have noticed occasionally the discourteous "Chopper Driver" hovering too close to a fixed wing aircraft. The other side of the picture is the fixed wing aviator who has no respect for helicopter rotor wash. Too often I have witnessed fixed wing aircraft taxied or parked (not tied down) in proximity to helicopters that were preparing to take off. So, Mr. Fixed Wing Driver, you also have a responsibility in this situation. Use a little common sense when taxiing and parking on the same ramp with helicopters.

MAJ ENGLE W. SCOTT
222nd Cbt Spt Avn Bn
APO San Francisco 96289

• Courtesy and common sense when operating near other aircraft are attributes of the safety-minded aviator of all qualifications. Indeed, the professional aviator can never ignore them, whether on the ground or in the air.
—The Editors

Sir:

I'm writing about your article "Conglomeration of Errors" in the Jan 68 issue of Aviation Digest. I'd like to add a little to your story because you missed some real interesting points.

It was very easy to see that a lot of the info in the story came from the teardown analysis performed jointly by Duane Davis and Lonnie Cunningham, two Aircraft Equipment Specialists assigned to Quality Audit & Special Projects Branch, Directorate for Quality, ARADMAC, Corpus Christi, Texas.

Dave found out that the fuel control was in the emergency or manual position when the engine was received. The engine failed from a violent overspeed of the N1 and N2. While the exact cause of the overspeed could not be determined, the pilot who has his fuel control malfunctioning and tries to fly on manual is asking for trouble. The N2 system did fail though, and this caused the first indication of trouble.

Lonnie looked at the tail rotor blade, short shaft, pylon mount, main transmission mounts, rpm limit warning detector, tach generator and pieces of the red main rotor blade. He found the cause of the uncontrollable vibration in the pieces of red main rotor blade found some distance from the crash site. The pieces of blade that Dave found were missing from the N2 wheel had exited from the tail pipe and one piece hit the red main rotor blade near the tip. The red blade tip separated in flight and set up vibration reported to have been so severe that the pilot's crash helmet was bouncing around on his head.

Gene Juelg and his crew in the Metallurgical Lab at ARADMAC X-rayed the red blade tip and found the piece of high density metal in the honeycomb of the red blade. Further analysis proved it to be the same type of metal used to manufacture the N1 and N2 blades.

We think that the UH-1B/540 shot itself down with pieces of its failing N2 turbine wheel. The analysis work is typical of the fine work being performed by the equipment specialists and lab personnel in the Directorate for Quality at ARADMAC. We are ready to help anyone needing our services.

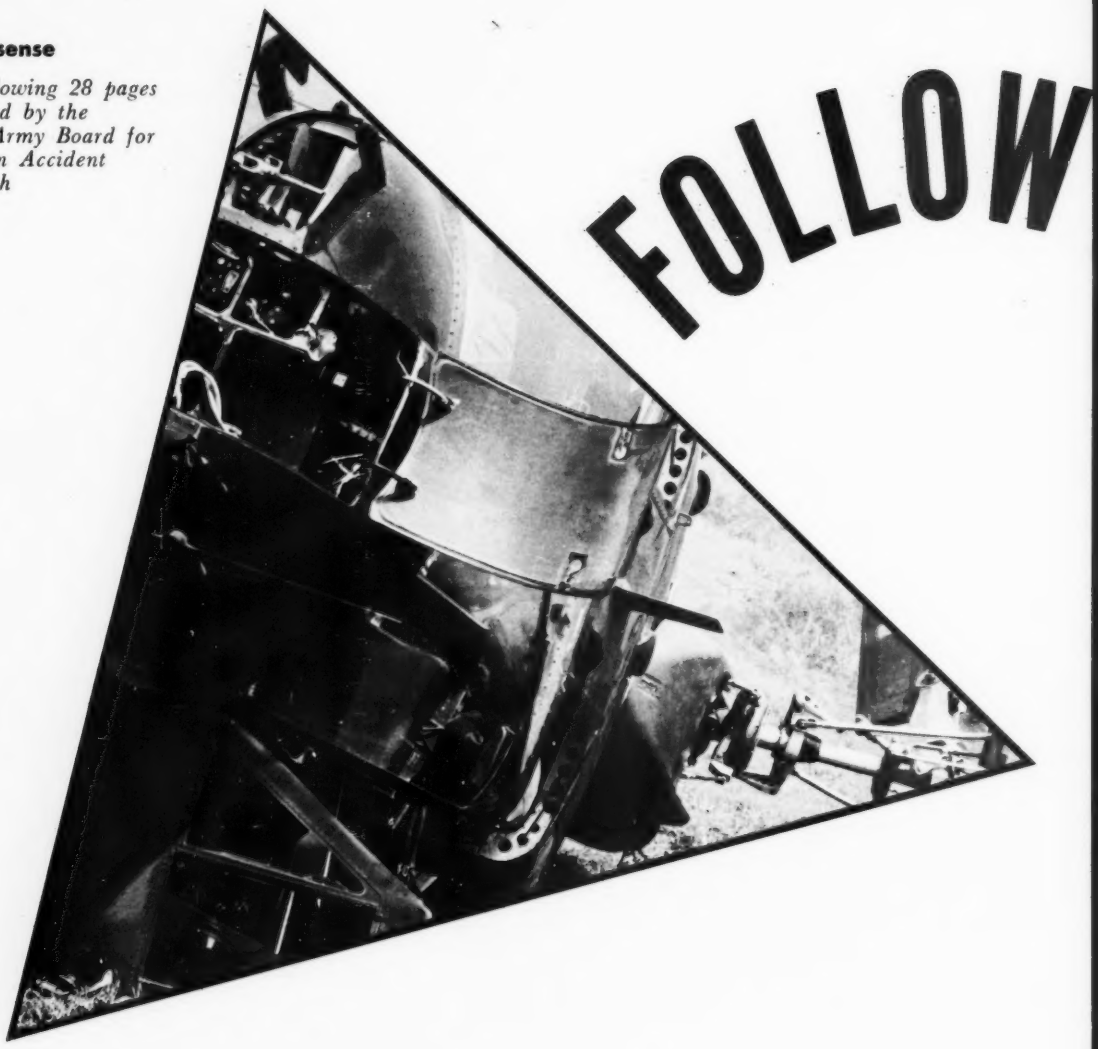
RAYMOND S. FARLEY
Ch, Quality Audit & Special Proj Br
ARADMAC, Corpus Christi, Texas

P.S. The lab and analysis work referred to in the story "Flight Following — Cancelled" was also done by Bob Perry, an Aircraft Equipment Specialist at ARADMAC.

• Our thanks to Mr. Farley for this additional information. Analyses of failed and suspect parts are among the most important and productive phases of aircraft accident investigations. Procedures for obtaining analyses are contained in USAAVCOM Supply Letter 33-67, dated 13 September 1967.
—The Editors

crash sense

the following 28 pages prepared by the U. S. Army Board for Aviation Accident Research



the diamond formation, under the circumstances, ruled out a go-around for the no. 4 aircraft on short final

THE LEADER

INVESTIGATION BOARD narrative: "The UH-1D was flying no. 4 slot position in a diamond formation. RPM bled off rapidly at approach termination, and the aircraft fell to the ground. Initial contact was hard, breaking the tail boom. It spun violently to the right and came to rest on its left side, facing to the left rear of the approach path . . ."

Pilot of lead aircraft: ". . . At the beginning of our approach, I would estimate that we were at 2,000 feet msl. I recall seeing red smoke marking the LZ. The smoke was not thick enough to obstruct our vision, although we considered it a possible hazard to aircraft landing later. At our entry to final, I believe our airspeed was between 75 and 80 knots. I was aware we were landing downwind, but did not believe the wind was strong enough to warrant an approach from any other direction. Our approach path was approximately 340°.

"I believe that considering our configuration — six combat-equipped troops, a crew of four, a high hill directly to our front, high density altitude, and downwind — a successful go-around for the formation, once termination of the approach began, would have been doubtful. At touchdown, my rpm was reading 6250. The flight leader's briefing indicated we were to land on the plateau on the side of the hill . . ."

Flight leader: "As I recall, we had just refueled to 1,100 pounds . . . Due to some low hanging clouds, some last minute changes were made as to exact landing zones to be used. I do not believe this affected the pilots on the flight since they had not seen the landing zones. This LZ, however, was not a change, and I had briefed on this assault, including the fact that we would assault into a plateau approximately halfway to the top of the hill. I had chosen a diamond formation and initially planned to land in a more northerly direction. I saw no need to change formation, although I was aware we were downwind . . . .

"We entered final at approximately 70 knots and began our approach. In my opinion, our approach was not excessively steep nor unusual. I noticed we lost rpm on termination, but I do not recall how much . . . ."

Copilot of no. 4 aircraft: ". . . I was copilot in the fourth aircraft in the first diamond formation. For the assault, we were using diamonds in column, or trail. As we began our final approach, I was aware that we were downwind and that the approach was unusually steep. We were having difficulty maintaining our position in the flight due to the steep approach and the fact that we were just a little above the lead when we started our descent. The pilot had beeped the rpm down to allow us to maintain the rapid descent without high rpm.

"As we began our flare, I was aware that a rather abrupt termination would be required. I became concerned because we were moving up into the formation and I thought the pilot lost sight of the no. 3 ship. A go-around was out of the question, as we had a steep hill to our front, and the formation around us. Once we began our flare, we were committed. The flare was high and we started losing rpm. I got on the controls and attempted to salvage the landing. As I applied collective, the aircraft settled straight and level, but hard.

"I would have preferred to use about any other formation than the one we were using. I did not remember that we had been briefed to land on the plateau and I expected the approach to be to the top of the hill. I did not see the smoke . . . I think our unit briefings are generally adequate, although I must admit many of the pilots just follow along without being aware of the situation."

Pilot of no. 4 aircraft: ". . . As we approached the LZ, I thought we were going to the top of the hill. I knew we were downwind, but felt that it was my job to hold my position in the flight. I didn't think the wind was strong enough to seriously affect us. I had some limited experience in diamond formation, but would have preferred any other, mainly for possible go-arounds. I heard the call that the LZ had been marked with smoke, although I never saw the smoke. The approach was abruptly entered and very steep. I beeped down to 6400 rpm to maintain the rapid rate of descent. We were near autorotation in

the descent, never above 6400 rpm. We terminated high and I began to have difficulty holding the aircraft. The copilot took control. There was no cockpit confusion as I was aware he had it. I did start beeping the rpm back up, but the pitch had been applied and we stopped high, so we didn't gain rpm. We fell straight down, hit hard, and turned to the right . . . ."

Pilot of no. 2 aircraft: "I was at the briefing but do not recall that the plateau was mentioned. I was not aware that we were downwind; nor was I aware that we were not going to the top of the hill until we began the approach. The approach was very steep. I believe a go-around would have been extremely difficult, but apparently possible since the no. 3 ship did elect to go around. At termination, I had 5800 rpm and full left pedal . . . ."

Pilot of no. 3 aircraft: "The approach was not normal. It was much too steep. I believe we went into it at about 60 knots. There was a question in my mind about the LZ. I thought we were going to the top of the hill. I saw no smoke to mark the LZ. I did not know the exact wind, but I knew it was unfavorable. I did not believe it was worth the risk, so I elected to go around. I left the formation midway on final and barely cleared the hill going around. I did not see the crash . . . ."

Analysis: "Until the aircraft entered final approach, indications were that the mission was routine in every respect. The approach was made as planned with a small directional change. As the flight began to enter final, however, events contributing to the accident began to compound rapidly. Events leading to the accident were determined to be:

"The approach was made directly downwind.

"The formation selected was a diamond formation which, under the circumstances, ruled out a go-around for the no. 4 aircraft on short final.

"The approach was apparently steeper than normal and was entered somewhat abruptly.

"Most of the pilots, including the pilot of the crashed aircraft, were not aware that the landing point was on the side of the hill.

"The pilot beeped his rpm to 6400 on final.

"The flare at the bottom of the approach was abrupt and high, aggravated by rotorwash from the other aircraft and the downwind condition.

"Collective pitch was applied prior to an attempt to increase the rpm, with a resultant further decrease in rpm.

"One contributing item, although difficult to definitely establish, was the apparent lack of attention on the part of the pilots to the details of the mission. Although the flight leader had specified the landing point, only two pilots recalled him mentioning it as the side of the hill rather than the top. . . ."

Cause factors: "Using 6400 rpm with 10 people aboard is considered the dominant cause of the accident. No attempt to increase rpm was made prior to the application of collective on short final. The fact that collective was not applied until short final indicates it was an abrupt, rather than a gradual action. This abruptness undoubtedly aggravated the already critical condition. The approach was terminated high, with a known downwind condition. The situation demanded that, if a successful go-around was to be accomplished, it had to be initiated early in the approach.

"The crew stated that they believed the maximum rpm was approximately 6650, regardless of the N_1 setting. This was stated as one reason for beeping to 6400 rpm on final, even though near autorotation N_1 was applied.

"The flight leader's decision to land downwind may have been dictated by the terrain and tactical situation. However, the formation used did not allow a go-around for the no. 4 aircraft at termination. Combined with the downwind condition, the formation used was an important contributing factor.

"Few of the pilots knew where they were going on the flight, although they had been briefed. It is apparent that, since they were not at the head of the flight they elected to adopt a 'follow the leader' attitude. None of the lift crews interviewed, with the exception of the flight leader, had maps."

First indorsement to letter of transmittal: "The established cause factors should not be limited to the actions of the pilot alone. Although the copilot was not qualified to act as an aircraft commander, he did have more experience in the type helicopter than the pilot. In consonance with established procedures, an experienced aviator is assigned to each mission to provide continuity and leadership. The mere fact that the pilot and copilot had agreed to alternate and split the time did not relieve the more experienced aviator of his responsibility. The copilot failed to recognize the fact that the pilot was in difficulty until the crash was imminent. He assumed control of the aircraft at a point where it was too late to salvage an excessive rate of descent with too little rpm. . . ."

from Federal Aviation Agency
ADVISORY CIRCULAR 60-2D

annual aviation mechanic safety awards program

THIS PROGRAM is a joint effort of the Federal Aviation Administration, the Flight Safety Foundation, and the aviation community. The agency established an Aviation Mechanic Safety Awards Program in 1963 and major segments of the aviation industry have given their cooperative support. The program is now established as an annual event.

The Annual Aviation Mechanic Safety Awards give recognition to aviation mechanics making outstanding contributions to air safety by maintenance practices. The national effort enables the public to recognize the importance of mechanics in aviation safety. It also serves to focus aviation mechanics' attention on the vital safety role they play in the practice of aviation maintenance.

Fifty awards are made on a state level, one in each state for the general aviation winner. If a winner is located in Puerto Rico or the Virgin Islands, additional awards are made. State general aviation mechanic winners become eligible for FAA regional general aviation awards. Air carrier mechanic awards are made on a regional basis only, due to the geographic locations of air carrier headquarters. State awards are FAA certificates, inscribed with the agency seal and citation, signed by the administrator, and permanently mounted.

Sixteen regional awards are made, consisting of one air carrier and one general aviation award in each of the following eight FAA regions: (1) Eastern, (2) Southern, (3) Southwest, (4) Central, (5) Western, (6) Pacific, (7) Alaskan, and (8) Europe, Africa, and Middle East. Regional winners are eligible for national awards. Regional awards are metal plaques, engraved with the agency seal and citation, signed by the administrator and regional director, and permanently mounted.

Two national awards are made—one air carrier and one general aviation. The national award winners are selected from the regional winners. National awards are medallions, created for the agency, and mounted in a presentation and exhibition frame.

Aviation industry organizations have coordinated an additional award for general aviation and air carrier national winners each year. Since this award is decided on an annual basis and may differ each year, industry awards will be announced during the award ceremonies.

All winners will be offered a resident or correspondence type (home study) maintenance training course of their choice, originating at the FAA Academy in Oklahoma City, free of tuition charge. The winner will be permitted to make his selection from a training course list available at each local FAA office. The list will contain dates and courses available (resident and home study) in both general aviation and air carrier categories.

In addition, one manufacturer in the industry will provide metalized replicas of FAA mechanic certificates, wallet size, to regional winners who hold valid FAA airframe and/or powerplant certificates. The company will also enroll the regional winners

All winners will be offered a resident or correspondence type maintenance training

in its Aviation Mechanic Club and issue a suitable certificate and lapel pin. This club has been organized by the company and is exclusively reserved for the regional winners of this awards program. It is possible that other segments of the aviation community will consider similar additional awards for future years. This is accomplished on an annual basis with the cooperation and consideration of industry organizations.

State and regional awards are presented in ceremonies scheduled by agency regional offices at state capitals, FAA regional offices, or at other selected locations. National awards are presented in Washington, D.C. Travel arrangements to presentation sites are made by the agency in conjunction with the aviation industry.

These guidelines for the selection of winners have been established:

1. For the suggestion of a design or "improvement" to an aircraft or powerplant or any of its components that led to or resulted in increased reliability and/or safety in aviation.

2. For the suggestion or development of a maintenance and/or inspection procedure that contributed significantly to safety in aviation.

3. For the consistent demonstration of a high level of professionalism and excellence in the performance of his duties as an aviation mechanic.

Eligible mechanics may submit their own entry forms. In addition, supervisors or other knowledgeable personnel may submit entry forms for eligible aviation mechanics. Entries should be made on FAA Form 1210-1, Entry Form For Aviation Mechanic Safety Award, and submitted to the FAA district office having jurisdiction over the geographic area in which the mechanic is employed. Winners are selected without regard for race, creed, color, sex, or national origin.

Aviation mechanics employed outside the continental limits of the United States who are foreign nationals employed by U.S. companies and who hold valid FAA mechanic certificates are eligible.

Aviation mechanics actively engaged or employed by aircraft, powerplant, or accessory manufacturers as mechanics performing "flight line" aviation me-

course of their choice, originating at the FAA Academy, free of tuition charge

chanic duties are eligible. Repairmen, authorized inspectors, designated mechanic examiners, and parachute riggers are eligible.

Aviation mechanics in the Armed Forces are eligible. Their entries should be those that could be applied to civil aviation use.

Employees of the Federal Aviation Administration and the Flight Safety Foundation are not eligible.

Contributions developed during the calendar year are eligible for the annual awards. The closing date for the awards will be December 31. Patented safety contributions are eligible. Qualified suggestions or developments, which previously have received awards from employers, are eligible. A contribution developed by the cooperative efforts of more than one person is judged accordingly. In this case, duplicate awards are granted.

An entrant must be working as an active aviation mechanic. For this program, the aviation mechanic is defined as an individual who is skilled in the methods, techniques, and practices necessary for the performance of maintenance, inspection, or alteration of aircraft as a whole or any of the major aircraft subdivisions such as engines, propellers, airframes, and appliances. He uses such skills either as the artisan who works with his hands or directly supervises others who work with their hands. This eliminates the professional engineer or the "mechanic" specifically employed, for example, as an airport janitorial service employee, or in similarly associated positions which in certain job descriptions could be titled "mechanic." The eligible aviation mechanic is not required to hold a valid FAA mechanic certificate in order to participate, except for foreign nationals.

Screening and selecting of entries for state and regional awards are made by committees composed of aviation mechanics, FAA personnel, and civil and military aviation personnel possessing the technical qualifications required to evaluate and judge entrant contributions. Committee members are selected from within the geographic boundaries of the particular area. Final screening and selection for the national awards are made by a committee composed of nationally prominent aviation people and FAA personnel. This national committee is established and administered by the Flight Safety Foundation.

Screening and selecting committees thoroughly review all entry forms to assure that entrants' "outstanding contributions" are within specified categories. This initial review eliminates entrants not within the specified guidelines. No further review is required. The remaining entries are then audited and verified by FAA inspectors prior to final consideration and selection.

In order to qualify, a contribution must be original and significant. It should have relatively broad application to the aviation field. In general, a contribution should be important to civil aviation or, if it is a military development, it should be one that could be applied to civil aviation. A contribution should be clearly attributable to the entrant.

The interest of an entrant in aviation safety by maintenance practices is a guiding criterion; i.e., his imagination and initiative in working beyond the requirements of his job to direct his efforts to aviation safety. An entrant not selected for award may apply for reconsideration by a letter of request within 7 days after the winner is announced. This letter is to be directed to the appropriate FAA regional office and originated by the person submitting the entry form in question.

Copies of FAA Form 1210-1, the official entry form, may be obtained from the local FAA office, or a reasonable facsimile made by the entrant.

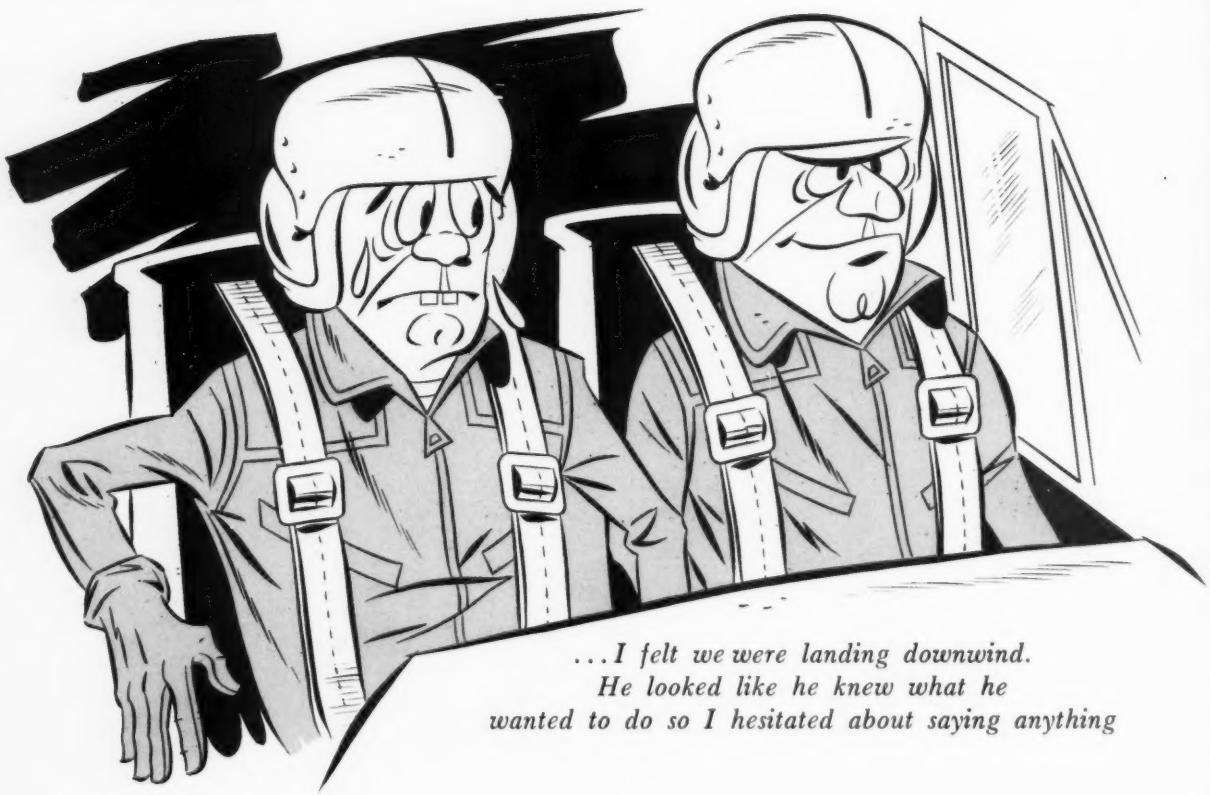
SCHEDULE

FAA offices will start to compile and collate submitted entry forms during July. State winners will be selected and the Washington headquarters advised in January. Awards will be presented during February.

Regional winners will be selected and the Washington Headquarters advised in February. Awards will be presented during March. National winners will be selected in March, and awards will be presented on dates scheduled by headquarters during the first six months of the year.

Regional offices will schedule the state and regional award events to suit each office within the established schedule.

Stranger In The Cockpit



. . . I felt we were landing downwind. He looked like he knew what he wanted to do so I hesitated about saying anything

UH-1C COPILOT: "The pilot and I had finished a mission and were in the helicopter with the engine running while the crew loaded four empty 55-gallon drums. As we were about to depart, an officer came over and talked to the pilot. The pilot got out of the left seat and the officer got in. Without a word he took over the controls. Although I beeped up the beep trim, the rpm bled down to 6200 during takeoff.

"He headed toward the crescent area, telling me about the mission en route. At the beach area, he made a left turn to base and another left turn to final to the northwest. Although I could see no positive ground indications, I felt we were landing downwind. He looked like he knew what he wanted to do so I hesitated about saying anything.

"The airspeed indicator read zero before we were down to 20 feet, but we still had pretty fast

forward movement. He continued the cyclic flare and the ship leveled off at 5-10 feet and then started climbing. I looked over at him and he seemed perplexed and unsure what to do next. I said, 'I've got it.'

"When the ship started a sharp turn to the right, we were about 50 feet up. I thought we had lost directional control when the pedals brought no response, so I rolled off throttle and tried to lower the nose to get some airspeed. We were sinking fast and the rpm was dropping off. I tried to level the ship and we hit the ground nearly level, tearing off the skids and breaking the chin bubbles. I shut down and we all got out. . . ."

Investigation board narrative: ". . . The group was required to provide a gunnery range for aircraft gunners to practice and test their weapons. The operations officer sandwiched in the mission to take some empty 55-gallon drums out to the selected range site between other missions. Loading was practically complete when the officer, complete with flight gear, appeared at the aircraft. He had just talked to the operations officer and said he was in charge of the project, knew what he wanted done at the site, needed some flight time, and would like to go as part of the crew. The operations officer agreed and the officer in charge of the project went to the aircraft and talked to the pilot about going on the mission.

"The ship was crowded with the empty barrels, the crewchief, gunner, and two passengers who were to work on the range. To accommodate the officer, the pilot elected to get out and give him his seat on the left side. The officer got aboard, and, with the loading completed, got on the controls, made the necessary radio calls, and departed . . . .

"The officer's only remarks directed to the copilot concerned the nature of the mission, of which he was already aware. Upon reaching the vicinity of the desired gunnery range, he made no circling recon of the touchdown area, but made a left base and final to a particular spot on the beach. He stated that he had looked over the lake southwest of the beach on downwind for an indication of wind direction. He said he was surprised by an impression that the wind was apparently from the northwest when it would normally be from the southeast, off the ocean.

"The copilot was a little surprised that the officer was apparently landing to the northwest because he felt they were landing downwind, partially because of the aircraft attitude, the yawing, and the speed over the ground. To the officer, the approach to 5-10 feet seemed normal. To the copilot, it appeared generally normal, except for the airspeed indicator reading zero at 20 feet, the considerable forward movement, and the feeling that they were landing downwind.

"The aircraft leveled off at about 5 feet and then began rising to 20-50 feet. The exact attitude of the helicopter and the position of the cyclic and collective at this period were unclear. The officer stated he had a nose low attitude, slight aft stick, and moderate collective, with up to 20 pounds torque. The copilot stated the ship was nose high, cyclic well aft, and collective unknown to him. The airspeed still read zero and the ship yawed back and forth during this climb.

"The officer could not figure out why the ship was climbing, while the copilot thought he was climbing in a go-around attempt. After rising to about 50 feet, the copilot looked over at the officer to see what he was doing, as there had been no obvious attempt to correct the zero airspeed. To the copilot, the officer appeared completely perplexed and uncertain what action to take. About the time the helicopter started a turn to the right, the copilot said, 'I've got it,' and made a pedal correction, with no response. He assumed antitorque failure and rolled off throttle to stop the turn. The helicopter, which had turned 30°-40° to the right from the approach heading, stopped turning.

"The rotor rpm began dropping and the copilot lowered the nose to gain airspeed, leveled the aircraft, and pulled pitch to cushion impact. There was some forward movement at touchdown, as the ship slid about 15 feet, tearing off the skids and cross tubes and shattering both chin bubbles. . . ."

Findings: "The officer did not make an adequate wind check at his intended landing site. He did not establish positively who was in charge of the aircraft. . . .

"The copilot did not attempt to establish who was in command of the aircraft. He did not suggest to the officer that they appeared to be landing downwind when he felt that they were. He waited until the officer got the aircraft into a condition from which he could not safely recover. He assumed antitorque failure. By applying corrective action from that assumption, he made the hard landing inevitable.

"The operations officer did not ensure an IP or aircraft commander was aboard. He did not ensure that the officer was qualified in the aircraft. He did not brief the crew about who was to be responsible for the aircraft.

"The aviator who was assigned to the mission as aircraft commander displayed poor judgment in electing to remove himself instead of the very young and inexperienced copilot to make room for the officer in charge of the project. . . ."

AEROMEDICAL CONSULTATION/

THE GENERAL HEALTH, physical condition, and capabilities of the Army aviator are both a command and medical concern. A maximum degree of extremity (arm-leg) function, dexterity, and effectiveness is essential to the aviator. It is from this functional approach the flight surgeon and various surgical specialty disciplines are of the greatest service both to command and medical service regarding fitness of aviators.

Regulations are quite specific regarding status of the neuromuscular system necessary to be on flying status. These regulations outline physical defects permissible still allowing the trained aviator to pursue his chosen field of endeavor. These same regulations, though designed with forethought and experience, can be a menacing, clenched fist over the head of the aviator. This may be especially true in times of active, armed conflict or the intensification in training necessary to conduct such a conflict. It is under these circumstances the aviator is most likely to sustain an extremity or back injury that abruptly eliminates all hopes for a continued career in aviation. Some of these injuries, naturally, may be quite serious and disabling, thereby terminating a budding career. Other injuries may be of such a nature that good, reconstructive surgery and rehabilitation can be expected to return the injured member to a useful state of function. It is in this type of case that a well-motivated, well-trained aviator may be given a chance at returning to flying status after an injury, thereby saving a tremendous financial investment.

LTC Robert L. Reid, MC
Chief, Professional Services
Lyster Army Hospital
Fort Rucker, Alabama

Inflight Evaluation of Injured Army Aviators

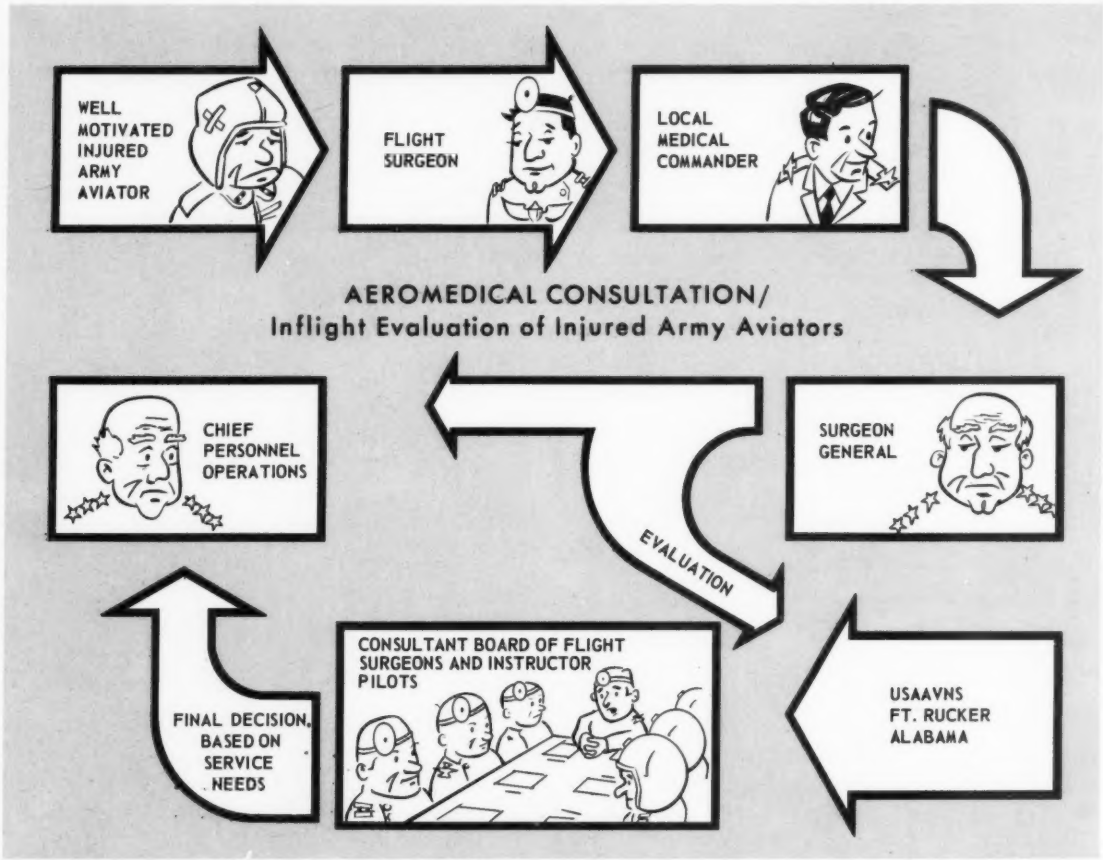
Latest statistics from the Department of the Army, as quoted in *The Army Times,* state that if you are an Army aviator and are killed the taxpayers have lost $100,600. If you are in the military but not an aviator and killed you are worth only $42,400. A disabling, nonfatal injury to an Army aviator costs the military an estimated $11,562. The same injury suffered by a nonrated soldier or officer is accounted for by a mere $4,300.

Probably the most important factor regarding injury is the morale factor. Psychiatrists say that fear of maiming may take precedence over fear of death during times of combat. If the aviator knows that modern medical and surgical technique can restore his extremities to a state of useful function that will allow him to pursue in some form his chosen field of aviation, he will probably be functioning under much less emotional strain. This knowledge in itself would permit a smoother convalescence for any physician who might be caring for him after a potentially devastating injury.

It is for the above purpose that Army Regulation 600-108, dated 31 May 1966, was conceived. This regulation discusses aeromedical/inflight evaluation of recovered injured aviators. It applies only to rated Army aviators whose physical condition following hospitalization for injuries precludes their meeting the usual class 2 flying standards. In some cases a waiver is necessary to actually permit retention on active duty. It does not apply to those aviators who are found unqualified for flying during conduct of a routine flight physical or medical consultation. It is meant to benefit those aviators who have recovered from injuries and who, in the opinion of unit flight surgeons, still possess motivation and some capability for flying, even with the possible restrictions regarding type of duty, type of aircraft, assignments, number of hours flying, etc.

It is hoped that when rated aviators are receiving surgical evaluation from any military surgeon, they will be informed of the possibility of such an inflight evaluation. In the vast majority of these well-motivated men, this would be a tremendous factor stimulating a more prompt rehabilitation phase.

How may an inflight evaluation of an injured Army aviator be accomplished? The unit flight surgeon gives the initial appraisal of the aviator. If he feels that the pilot still possesses some capability for flying duty and is well-motivated, the request for flying duty and medical documentation of the case are then sent to the local medical commander. The commander refers appropriate cases to the Surgeon General. The Surgeon General determines the necessity for medical evaluation. He then coordinates with the Chief, Personnel Operations for evaluation of the needs of the service and the basic branch of the individual fliers. When the needs of the service are satisfied, the Surgeon General then coordinates with the United States Army Aviation School, Fort Rucker, Alabama, for actual scheduling of the inflight evaluation.



This aeromedical consultation/inflight evaluation is a comprehensive medical and surgical evaluation as well as actual inflight appraisal of the recovered injured aviator. It is conducted by the Aeromedical Consultation Service, Department of Aeromedical Education and Training, United States Army Aviation School, Fort Rucker, Ala. Appropriate consultations, laboratory and X-ray studies are then taken to fully understand and appreciate the entire medical problem.

After this workup has been completed and results appear satisfactory to all concerned, the inflight evaluation is actually begun. During the evaluation the aviator, selected instructor pilots, and flight surgeons work out in all aircraft in which the injured aviator had been previously rated. The evaluation is meant to check, in actual aircraft, the aviator's reaction time to physical inflight requirements and stresses in light of his physical impairment. The aviator will be required to demonstrate his ability to safely perform all normal functions associated with piloting and preflighting the aircraft.

The selected instructor pilots will provide the Department of Aeromedical Education and Training at the Aviation School a complete report regarding performance, capabilities, and/or limitations of the aviator in each type of aircraft flown.

The medical consultations and inflight capabilities are evaluated by a consultant board of flight surgeons and qualified instructor pilots. The conclusions and recommendations are reviewed by the Surgeon General and forwarded to the Chief, Personnel Operations. Here, the final determination is made regarding flying status in each case along with the recommendation for restrictions, if any.

The need and mechanics of obtaining inflight evaluation of the recovered injured aviator have been discussed. Conserving well-trained, valuable, highly motivated, Army aviator fighting strength is the goal.

"I spotted what I thought to be a flat grassy area"

UH-1D AIRCRAFT COMMANDER: ". . . I had been into this LZ twice before, carrying seven troops with 1,200 and 1,000 pounds of fuel respectively. On this trip, I had 800 pounds and was carrying seven troops, so I felt that I would have an extra margin of power in the LZ. . . . I knew that if I went to the same spot I had on the last two lifts, I would not be able to land, so I decided to try for another area.

"I spotted what I thought to be a flat grassy area and made my approach to that point. About 6 feet from the ground, the rpm was down to 6200. Then I saw that the area was not flat, but sloped. I saw that the nose of the aircraft would be pointing into the slope, so I terminated at about a 1-foot hover with no forward speed. At termination, the rpm warning light came on and, at the same time, the gunner asked me to move forward.

"The rpm was 5800-5900 and I knew I wouldn't be able to hover up the slope. I told the gunner and crewchief to get the troops out. A few seconds later, the right skid hit the ground hard and the aircraft started a right turn. I first thought of the rotor blades and tried to center the cyclic, but the aircraft rolled. I think we rolled over about five or six times and then fell down a 50-75 foot embankment. The ship came to rest on its left side. . . ."

The helicopter was destroyed and one passenger killed.

Investigation board narrative: ". . . The approach into the proposed LZ was slightly fast, the rate of descent was high, and the approach could not be terminated on the ground because of the slope. The aircraft commander stated that his rate of descent was 500-700 fpm. This rate is in excess of the desired for a heavily loaded aircraft. The aircraft commander attempted to stop his forward travel at 6 feet, but the rpm bled off and the aircraft fell through and stabilized momentarily at a 1-foot hover. The crewchief then asked the aircraft commander to move forward because the aft portion of the aircraft extended over a steep portion of the landing area.

"The tall grass and steepness of the slope tended to destroy the ground effect which possibly would have allowed the aircraft to hover at 1 foot and maintain 6000 rpm, as it had on the two previous sorties which were terminated over more level terrain.

"The aircraft was loaded with seven passengers, a crew of four, and 800 pounds of fuel. On the two previous sorties, the fuel load was 1,200 and 1,000 pounds and there were seven passengers in each case. The aircraft was 400 pounds lighter than it was for the first sortie. Though the aircraft was lighter, the performance charts indicated that it should have been able to hover in ground effect at a gross of 9,100 pounds, and out of ground effect at 7,800 pounds. The selected touchdown point placed the aircraft in a position requiring the ability to hover out of ground effect to make a safe landing. . . .

"This accident was the result of overloading the aircraft for existing conditions and using an improper approach technique to an unsuitable landing point.

"The aircraft commander was serving his first tour of flying duty after graduation from flight school. He had been recently appointed aircraft commander and demonstrated poor judgment. This was illustrated by the fact that he lost rpm while terminating at a hover during two previous sorties with the same aircraft load of seven passengers. Based on this experience, he should have lightened his load by reducing the passenger load."

Findings: "Go-no-go limitations were not adhered to. The aircraft was overloaded at takeoff and could not hover out of ground effect during the approach termination.

"Improper approach technique.

"LZ was littered with stumps and fallen trees and not properly prepared to allow touchdown on level area.

"Proposed landing site was not properly evaluated. The touchdown point was unsuitable due to excessive slope. . . ."

Reviewing official: ". . . During the 30-day period preceding this accident, the aircraft commander had flown 153 hours. Although the investigation board did not list this in their findings, I consider this a possible contributing factor. . . ."

FILTERS, SCREENS, AND STRAINERS

Ted Kontos

AN OH-13 ENGINE lost power and failed. The helicopter was autorotated. When the pilot of another OH-13 landed to offer assistance, his engine also failed. A check showed an accumulation of sand and water in the fuel tanks of both helicopters. Several weeks later, the engine of a UH-1 failed. Rust, scale, and dirt were found in the fuel system. These contaminants were traced to 55-gallon drums used for refueling. More recently, a CH-47 engine lost power. Several gallons of water were drained from the aft tank.

Contamination problems are not limited to the fuel system. Contaminants in the hydraulic system of a CH-47 resulted in loss of control and a major accident. Contaminated hydraulic fluid caused servo failures in several UH-1 helicopters. Many instances of low engine oil pressure were traced to relief valves held open by particles in the oil. Turbine engines have failed from lack of lubrication due to clogged oil passages. Others failed when bearings were destroyed by solid contaminants in the oil system.

To prevent such failures, manufacturers design and produce many kinds of strainers and filters. These are made in a variety of forms and sizes. Some have openings so small they can't be seen with the naked eye. Others are so large a man can put his fist through them. Each is designed to perform a specific function in a particular system.

At one military installation, contamination problems were virtually nonexistent until newer aircraft with gas turbine engines replaced the older ones. Engine problems started immediately. Most were due to faulty fuel control operation. Many failed within 4 to 20 hours of engine operation. The cause was finally traced to minute dirt particles which wedged around a slide valve, causing it to bind. The cure was improved housekeeping practices in handling and storing fuel, and increased filtration before servicing aircraft.

Soon after the fuel control problem had been solved, hydraulic pumps began to fail. Again, contamination was the cause. Small particles were found accumulating in the variable displacement piston pumps, holding ball check valves open and causing pressure drops. While mechanics were careful to ensure that fluid was not contaminated when servicing aircraft, they failed to use the same care with hydraulic test stands. As a result, contaminated fluid in the test stands mixed with that in the aircraft during troubleshooting and ground operational checks. A second source of contamination was found with the practice of using masking tape to seal open hydraulic lines after components were removed. Hydraulic fluid remaining in the lines acted as a solvent, dissolving the adhesive and any dirt particles on it into the system.

Filtering and straining devices are classified according to filtering ability, determined by the size of the openings. A strainer is defined as any screen *200 mesh or larger,* and a filter as anything *less than 200 mesh.* The openings of a 200 mesh screen are 74 microns in size. One micron is equivalent to 1/1000 millimeter or .000039 inch. Its relative size can more readily be understood by considering that the smallest particle a human eye can distinguish lies in the range of 40 microns. Red blood cells, which cannot be seen with the naked eye, are approximately 8 microns in size.

In fuel systems, dirt, sand, paint, rust, scale, shavings, and water are some of the most common contaminants. These are occasionally joined by tools, aircraft hardware, paper, and similar items which find their way into fuel cells and lines. Certain microorganisms thrive in JP-4 and other jet fuels.

To prevent moving parts from binding and clogged orifices, filters and strainers are strategically located. Strainers block large items and coarse particles, while filters trap the smaller ones. But what happens if excessive amounts of contaminants are suddenly introduced or permitted to accumulate in the system, if water is present, or if fuel contains microorganisms? Excessive amounts of contaminants can clog filters to a point that will restrict or block fuel flow. A by-pass provision may prevent immediate engine problems by allowing fuel to flow past a clogged filter, but the contamination will spread.

While water will settle rapidly in gasoline, it has a tendency to remain suspended in JP-4. Water in suspension is virtually invisible and may be compared to moisture in the atmosphere. As the outside air temperature drops, this water will condense into free water which can then freeze as it passes through fuel lines and filters.

It becomes apparent that fuel filters and strainers cannot perform all functions necessary to guarantee the unrestricted flow of clean fuel to the engine. *They are not intended to do so.* They are designed—and function—to furnish adequate filtration—*provided the fuel has been properly handled, stored, and filtered before servicing aircraft, and provided maintenance personnel have correctly maintained strainers and filters.*

FILTERS, SCREENS, AND STRAINERS

Although water in hydraulic fluid has caused corrosion and erratic operation or failure of servo valves, it is dirt, shavings, and other minute particles which cause most hydraulic problems. Again, the ability of filters and strainers to function as designed is not the problem. In one demonstration, a factory representative disassembled a propeller regulator and thoroughly cleaned it. He then *wiped the regulator with a clean cloth* and reassembled the unit. After installing the propeller, he serviced it with hydraulic fluid and operated it. On teardown, the filter in the regulator was found to be almost completely blocked by lint. The seemingly insignificant act of using a cloth to wipe the regulator could have resulted in propeller failure during flight. The filter had done its job, but almost lost its usefulness in the process.

Contaminants in engine or transmission oil can cause failure of parts either directly through premature wear or indirectly by restricting oil passages, which reduces lubrication and increases operating temperatures. A bearing used in one gas turbine engine weighs more than 8 pounds and appears to be a ruggedly built component, but a close look at it during operation shows how vulnerable it really is. At a shaft speed of 10,000 rpm, a load of nearly 400 pounds is imposed on each of its 28 rollers 5,000 times every minute. During this minute, each roller spins on its axis 55,000 times.

Lubrication for this bearing requires oil at 250° F to be pumped to it through metered orifices at a rate of 6 pounds per minute. *A decrease in oil flow or rise in temperature, or the presence of any hard particles during operation can cause destruction of the bearing.* Preinstallation care of this bearing requires keeping it wrapped in greaseproof paper and handling it only with gloved hands.

Neglect of air strainers and filters has also caused its share of troubles. A clogged air filter prevented the bleed air band of a T-53 engine from fully closing and caused loss of power. Similar power losses and high exhaust gas temperatures resulted from restricted airflow to engines because of dirty air filters. Recently, the inlet air filters of one engine were found to be almost completely blocked with caked dirt. The need for frequent inspections, particularly when operating aircraft in dusty, grassy, or sandy areas, can readily be seen.

CLEANLINESS — Good housekeeping is a must for contamination problems. Proper handling and storing of fuel is a first step. The use of filter separators before servicing will remove solid particles and most water in a free or suspended state. These procedures are spelled out in TM 10-1101, Petroleum Handling Equipment and Operation. Ensuring that servicing nozzles are clean and taking care to prevent scraping them against the filler necks during servicing will further reduce the amount of dirt and shavings introduced into the fuel. Servicing aircraft in areas free from blowing sand and dust will promote cleanliness.

Precautionary measures must be taken when servicing oil and hydraulic systems. If cans are used, they should be cleaned before they are opened and discarded after use. If the entire contents are not used, it is better to discard the remaining portion than to risk contamination. The best solution for dirty engine inlet air filters and screens consists of frequent inspections and *cleaning*. The operational environment may require increased frequency for these inspections.

MAINTENANCE — Cleanliness depends in great part on properly performed maintenance. Fillers and caps to tanks and reservoirs must be undamaged and seals must function properly to prevent water, dust, and other contaminants from entering systems. Accounting for all tools, hardware, and other items used during maintenance, and capping off open lines after removing system components are necessary measures. In one instance, a candy wrapper was found in a fuel line. In another, the instructions for storing a self-sealing fuel tank were found inside the tank, blocking the fuel outlet.

Following TM procedures for draining fuel sumps before flight gets rid of settled water, shows its amount, and indicates the presence of other contaminants. But draining fuel sumps *before* servicing the tanks can provide additional benefits. During flight, particularly during letdown through clouds, moisture accumulates inside fuel cells. As aircraft enter warmer areas near the ground, this moisture condenses into water. Servicing aircraft before removing this water will cause it to mix with the incoming fuel and much of it may be retained in suspension.

Cleanliness during overhaul and maintenance of components is another must. Correct processing of engines, components, and parts for storage or shipment keeps them clean and prevents corrosion. TM procedures should always be followed. Inspection and maintenance of filters and strainers must be made in accordance with TMs. If contamination is widespread in a system, it may be necessary to flush the entire system.

Filters, screens, and strainers are continually being improved. Those now in use are capable of doing an effective job *as long as the demands placed on them do not exceed their capabilities.* By-the-book service and maintenance will keep them functioning within their limitations.

THE COMMON COLD CAN KILL

Warrant Officer Joseph Wychoff
A Company, 4th Aviation Battalion
From THE IVY FLYER, 4th Infantry Div

IT WAS LATE evening when operations received a request for the AO ship to stand by for a mission to transport four passengers. The AC [aircraft commander] pulled pitch at approximately 2230. Departing from runway 27, he made a left climbing break and rolled out on a heading of 170°.

At approximately 3,500 feet, cloud cover was encountered. This presented a serious problem, since a cruise altitude of at least 4,000 feet was needed to clear the mountains en route. Normally, under such weather conditions, the AC would have elected to turn back. But because of the tactical necessity for the four passengers to coordinate a combat assault the following morning, he decided to try to complete the mission. The destination was under attack by an enemy force of unknown size at this time.

Deciding to continue climbing and try to break out on top, the AC called control and requested a radar vector. Control issued the vector and said that his present heading was good. At this time, the ship was at 8,500 feet and still had not broken out. They finally broke out on top at 9,500 feet.

The remainder of the flight was uneventful except for extremely poor visibility. At approximately 2330,

the radar controller advised the AC that he was 6 miles out on his present course. The AC radioed the controller that he was descending. The controller then advised the AC about a C-47 working at 5,000 feet due south of destination. After this transmission was accomplished, the pilot started a 1,000 fpm descent to arrive at approach altitude before they reached the destination airfield. The pilot had control while the AC tried to establish radio contact with the airfield.

They broke out at approximately 5,500 feet and the pilot requested the AC to take control at about 4,000 feet. Immediately after the AC took control, the pilot placed both hands on his face and complained of severe pain above his left eye. It became so intense that the pilot had great difficulty remaining calm. The AC continued the approach and landed. After refueling and a wait of approximately 30 minutes, the helicopter was released to return to its base. During this time, the pilot's pain subsided.

As the aircraft reached altitude on the return trip, the pilot's facial pains came back, as severe as before and above both eyes. He was incapacitated — his vision impaired by watering of both eyes and reduced muscle control caused by the extreme pain. If an inflight emergency had arisen, he would have been of little or no assistance to the AC.

Fortunately, no emergency arose during the return flight. After landing, the pilot was taken to the dispensary and treated by the flight surgeon. He was given various medications and a pain killer, relieved from flight status, and placed on bed rest. The next morning his pain was almost completely gone, and on the second day he was returned to flight status.

Let's consider this a little more carefully, with emphasis on why it happened. First, the pilot had a slight cold which he did not consider serious enough to warrant going on sick call earlier that day. While climbing to altitude, his sinuses were drained of air. When descending, his sinus passages did not refill with air, creating a pressure differential. This difference in pressure is what caused his severe pain. The most probable cause for this is that his sinus passages were clogged and swollen by his cold. After he was given medication to relieve the swelling and break up the congestion, his sinuses refilled with air and the pain subsided as the pressure differential was eliminated.

This situation could have been avoided if the pilot had realized the consequences of flying with a common cold. In this case, no damage resulted. However, if an emergency had arisen, the fate of the crew and aircraft would have been seriously jeopardized by one crewmember's inability to function properly and effectively. Let's not venture a guess at the fate of the aircraft and crew if the AC had been suffering from the same ailment.

THE COMMON PROBLEM

Captain Bill Jeffrey
Flight Surgeon, 4th Aviation Battalion

LAST MONTH, when the general inspected the flight surgeon's office, he asked, "What's your biggest medical problem?" In this age of heart transplants we were hesitant to answer, "Sir, it's colds."

This is why: Since the division arrived in Vietnam, there have been 528 occasions when a man walked into the dispensary with a running nose, cough, or sore throat. Countless men just sniffed and never bothered to drop by.

Colds are common for many reasons. In the Army you are in close contact with many people and when one man develops a cold, it spreads quickly throughout the unit. In Vietnam, you are exposed to many new and different viruses and your body hasn't immunity to them. You breathe much dust and this causes irritation and allergic reactions in your nose.

Flying personnel in particular should beware the common cold. You are exposed to a condition the ground pounder isn't — rapid changes in altitude. The combination of altitude changes and colds can add up to a headache, a real headache. You have several hollow spaces in your head. This is no reflection on your intelligence. The spaces are the middle ears and the four sinuses around each eye. All these spaces have small openings (canals) to the outside which allow air pressure to change. These canals are lined with a mucus membrane which swells when you have a cold and partially or completely blocks the openings. This will prevent the pressure from equalizing.

As you gain altitude in your chopper, the air in the middle ears or sinuses usually escapes. But when the tubes are blocked, they act as valves, and during descents, as the atmospheric pressure increases, the air doesn't return to the spaces. This causes pressure differentials and pain — pain in your ears, pain behind your eyes.

The second problem is that an ear or sinus block can continue for a day or longer and, because the spaces don't drain, infection may occur. If this happens, you can expect to be grounded at least 5 days. How can this be avoided? See your friendly flight surgeon when you have a cold. If he could really cure you, he wouldn't be living in a hooch in Vietnam eating C's. He'd be in a villa at Papallo, Italy, eating pheasant. Don't expect the impossible. The best that can be done is to control the symptoms.

If the cold is mild, a nasal inhaler or nose drops used in moderation will dry the mucus membranes and allow a person to fly without danger. If the cold is bad, especially if you have pain around the eyes or difficulty popping your ears, you shouldn't be flying. Most medicines that relieve these symptoms contain antihistamines. The major effect of antihistamines is drying the mucus membranes. The major side effect is drowsiness. You are cautioned not to drive a motor vehicle or operate heavy machinery while using antihistamines. And you shouldn't fly.

The cold will run its course in a week. Antibiotics will reduce the time to 7 days. In other words, this is a malady penicillin doesn't cure.

If an ear or sinus block develops while flying, stop your descent, and if possible regain altitude. Then descend slowly and valsalva (pop your ears) frequently. If it doesn't clear, get to a dispensary immediately.

It's difficult to avoid colds. Well ventilated, uncrowded living and sleeping quarters are important. Avoid people who cough in your face. Don't use other people's drinking glasses. Try to get enough sleep and nourishment. Your flu shot? It helps prevent influenza, which consists of a fever of 101°-104°, lasting 2-5 days, chills, prostration, aches, and pain. It does not prevent colds.

In truth, colds are with us, no matter what. Until a new medical breakthrough arrives, the most important action you can take is to avoid complicating matters by flying with a bad one.

"We All Knew We Were Out Of Gas"

OH-23G PILOT: "I was commanding a sweep operation in a UH-1C. It was getting low on fuel, so I landed near the ground elements and called an OH-23 pilot in to trade aircraft so that I could stay on station. I flew it for approximately 1 hour, then called for another ship. It landed beside me and the pilot got into the one I had been flying to return to base camp for fuel.

"I flew over the operation for approximately 15 minutes and landed. As I got out, the pilot of the first OH-23 left an armored personnel carrier, got into the helicopter, and took off. I returned to the LZ after approximately 30 minutes and found the helicopter running at ground idle. I boarded the helicopter with the pilot and crew-chief.

"The weight was in the counterbalance position on the tail boom. The sweep had been completed, so I instructed the pilot to stay in the ship and made a hover check. It hovered easily at about 23 inches and control was normal, so I backed into the downwind corner of the clearing and took off.

"The ground elements mounted and headed back toward base camp. After covering the crucial part of their route, I circled back over them and found the rear tank had thrown a track and stopped the column. As I was looking at it, the pilot asked if I

had heard him say that the ship would run out of fuel with the gauge showing 7 gallons. I immediately turned toward base camp, noting that the gauge read 13 gallons and mentally estimated 20-30 minutes remaining. I estimated a 7-10 minute return flight.

"I called the pilot of a slick returning to base camp to keep an eye on me since my fuel was low. I had flown about 4 miles when the engine coughed, with the fuel gauge indicating 12 gallons, then quit. I entered autorotation and started a left turn into the wind toward the nearest clear area. I was unable to turn completely into the wind from my altitude, and aimed for a large clearing beyond a canyon and some low brush. The clearing was beyond safe reach, but the canyon was too steep to land in so I flared and pulled pitch to stretch the glide, leveling the ship just before running out of pitch at about 2 feet at an apparent speed of 10-15 knots. We hit level, slid forward about 6 or 7 feet, then began to roll forward. I pulled the cyclic full aft and the main rotor cut the tail boom off, turning us about 15° left.

"I radioed our approximate location to the chase ship and told the pilot that no one was injured, then shut off the switches and got out . . ."

Crewchief: ". . . We flew around the area until the track vehicles started for home so we could guide the way. I saw the fuel gauge showed 23 gallons. I told the pilot the tank would be empty when the gauge showed 7 gallons. There was no reply. I was getting ready to tell him again when the gauge showed 17 gallons, but the other pilot said, 'Sir, did you hear the crewchief say the tank was empty on 7 gallons?' There was still no reply . . . We got down to 13 gallons and the other pilot told him again. He replied this time, but I couldn't make out what he said. I did hear him call the ground element to tell them that we were going for fuel. We headed back and, after a few minutes of flying, the engine started cutting out. We all knew we were out of gas . . ."

Investigation board narrative: ". . . The fuel remaining in the carburetor was approximately one-fourth cupful and there was a pint in the tank, indicating fuel exhaustion as the cause. The electrical system was functioning and a check of the fuel gauge, with the helicopter in nose low, level, and tail low attitudes indicated 10½ gallons remaining.

"The total time flown on the aircraft since refueling was approximately 2:10 with an additional 20-30 minutes of ground idle time. The normal fuel consumption for an OH-23G is 15-18 gallons per hour, with 2:30 used for flight planning. Due to numerous crew changes, the confusion resulting from these changes, and the attention of the pilot primarily devoted to the organization and movement of the ground element, it is highly possible more time was flown than the flight log indicated.

"The pilot did not acknowledge the crewchief's or other pilot's cautions about the fuel gauge until the gauge indicated 13 gallons. This situation developed because the attention of the pilot was devoted to duties other than flying . . . This error was compounded by the fact that another aviator was in the helicopter and could have flown it while the pilot devoted his full attention to running the ground element.

"The faulty fuel quantity gauge had been written up on two previous occasions. The aviators, other than this pilot, were aware of the fuel gauge inaccuracy and the other pilot tried to inform him of it. However, with his attention primarily on other matters, he did not recognize the situation until too late for corrective action . . ."

Findings: "The pilot assumed command of the aircraft without checking the DA Form 2408-13 and without asking the pilot who brought the helicopter anything about it.

"The pilot allowed his attention to be dominated by outside actions and failed to heed warnings by the crewchief and other pilot.

"The failure of the other pilot to insist that the pilot's attention be called to the low fuel state indicates poor coordination between crewmembers.

"The pilot changed aircraft several times to remain over the area. For each change, he assumed command as pilot. He was uninformed about the status of the aircraft and relied on another pilot and crew to perform duties that were his responsibility. He failed to correlate fuel remaining with the time flown and relied solely on an inaccurate fuel gauge . . ."

I am familiar with the fuel range capabilities of the aircraft involved in this flight and have planned the flight accordingly.

ETD	ETE (Home base)	HOURS OF FUEL 2+30	AUXILIARY BASE OF 1ST INTENDED LANDING

FORM "F" FILED AT — DATE FILED (Day, month, year)

WEATHER IS FORECAST TO REMAIN VFR FOR THE DURATION OF THIS FLIGHT. I AM FAMILIAR WITH ALL CURRENT REGULATIONS AFFECTING THIS FLIGHT AND THIS FLIGHT WILL BE CONDUCTED IN ACCORDANCE WITH SUCH REGULATIONS.

CLEARANCE AUTHORITY — PILOT'S SIGNATURE

ACTUAL DEPARTURE — ACTUAL ARRIVAL

REMARKS

DD FORM 1080 1 JAN 58 — REPLACES AF FORM 113, 1 NOV 51, WHICH MAY BE USED.

E OR G ?

there is a difference

STATUS SYMBOL a	FAULT b	REASON FOR DELAY c	DATE (From DA Form 2404 or 2408-13) d	ENTRY APPROVED (Signature) e	DATE (To DA Form 2408-3 or 2408-13) f
/	20 March Fuel gage inaccurate				

DA FORM 2408-14, 1 JAN 64 — UNCORRECTED FAULT RECORD (TM 38-750)

OH-13E PILOT: "We departed at 0830. . . . En route to our destination, we decided to fly to another town. We shut down at 0930, and stayed on the ground until 0950 before restarting. The co-pilot checked the fuel tank because the fuel gauge was written up as not accurate. He told me that we had a little more than half a tank.

"We took off and were flying along at 700 feet, discussing ditching procedures. We were approaching the river when the engine stopped. It just stopped with no warning. I called an airfield and gave them our position.

"I had seen a small boat in the water not too far away, so I decided to try and land as close to it as possible. I entered autorotation and, as I headed close to it, the boat started to drive off. I flared at 25 feet and held it until the tail rotor guard touched the water. I then leveled the aircraft and started pulling pitch at 4 feet. I applied full right cyclic and the aircraft rolled to the right.

"We stayed in the aircraft until the rotors hit the water. I left through the left door. I had already loosened my seat belt. The boat returned and picked us up in a very short time . . ."

Questions to pilot:

Q: "When you filed your flight plan, were you familiar with the fuel endurance of the OH-13E in hours and minutes?"

A: "I had flown the E model before for periods of an hour and a half to 2 hours. I was under the impression it had a 2-hour capacity. I thought it would fly for 2 hours and that is what I had on my flight plan. The checklist which we received did not specifically state."

Q: "Are you familiar with fuel reserve requirements on VFR flights?"

A: "Yes. It is 30 minutes."

Q: "With a fuel reserve of 30 minutes, how long should you fly?"

A: "An hour and 30 minutes. I thought the fuel endurance was 2:30 and thought I could fly for 2 hours."

Q: "Where did you get this information? Were you taught this by the standardization pilot or instructor pilot?"

A: "I originally checked out with the G model. I really did not have any idea there was any drastic difference between the G model and the E model as far as fuel capacity is concerned."

Q:"Were you familiar with the fuel consumption of the E model in gallons per hour?"

A: "Not technically."

Q: "Did you check your fuel tank before taking off from the airfield?"

A: "Yes. It was full."

Q: "Did you place reliability on the fuel gauge?"

A: "The fuel gauge was inaccurate and written up as inaccurate in the aircraft forms."

Q: "When you landed and started to return to the airfield, did you check your fuel tank?"

A: "Yes, my copilot checked the fuel tank. He thought something was wrong with my fuel gauge as it showed a quarter of a tank left and the tank looked to be about half full. I told him the gauge was inaccurate and not to place much faith in it."

Q: "Did you fly both the G and E models?"

A: "Yes."

Q: "And the difference between the two was not explained to you?"

A: "Not to my memory. We flew the G model 2 hours on the initial orientation and the autorotation checkout. We went out and did autorotations in the E model. I was cleared for solo at that time."

Q: "How did you manage to get out of the aircraft when it went down? Did you have to swim a long time?"

A: "When the aircraft hit the water, it stood upright 3-5 seconds before rolling to the right. The copilot was on the right side and had a greater risk of being hurt. He stayed in the aircraft longer than I did. I got out when the water hit my chest and went under about 2 feet before I surfaced. The copilot told me he went down 10-12 feet. The aircraft went down on his side and he had to come back up and out of the left door. There was a boat in the vicinity and I had to swim 100 feet or so. I am a weak swimmer and could have easily drowned. It was about 300 feet short of a mile to shore."

Q: "Did you have a drop in manifold pressure?"

A: "No."

Q: "Do you remember the power settings?"

A: "I was flying with 3100 rpm and had 23-24 inches of manifold pressure — cruising along at 70 knots."

Q: "Did you use the dip stick at all?"

A: "No sir. Fuel serviced was 46 gallons. We were flying back and I had flown roughly an hour and 40 minutes and hit a town. The fuel gauge was on empty. The copilot looked and estimated it would take about 20 minutes more to get to the airfield. I said we would be running close to 2 hours when we got to the airfield. He asked, 'How much does this thing take?' I said, 'About 15 gallons an hour.' I gave him the book and he looked and it had 46 gallons of fuel written in the -13 . . ."

Q: "When you decided not to follow the route as indicated on your flight plan and went to the other town, did you notify anybody by radio?"

A: "I tried to reach the airfield by radio, but was unsuccessful."

Q: "Why was the aircraft flown at 700 feet, particularly crossing the water?"

A: "We had to fly low because of the haze in the air. In order to get out of the haze, we went down and stayed below it."

Q: "Were you fully checked out?"

A: "No."

Q: "What was your actual flying time with the E model before?"

A: "I believe it was 6 hours."

Questions to copilot:

Q: "Are you qualified in the E model?"

A: "I haven't been checked out as yet. I am familiar with the technicalities of the aircraft. I have flown the T model before."

Q: "Were you aware of the discrepancy in the fuel capacity between the E and G models?"

A: "I looked in the log book and it stated 46 gallons. I checked the tank before we departed the town and it looked like it was over half full and we had only been flying an hour."

Q: "Did you know the dip stick was there? Did you check it?"

A: "I just relied on the eye. The fuel was over one-half. I looked into the tank when we were sitting on level ground."

Questions to IP:

Q: "Testimony by the pilot concerning the accident indicates carelessness on his part or lack of knowledge of fuel capacity and range of E model and the difference between the E and G models. What are the normal procedures with students so far as explaining the difference between the models?"

the faulty fuel guage of this aircraft had been listed on the aircraft maintenance log for 4 months

A: "We go through the normal procedures and in preflight I tell the student about the fuel range capacity. I state this in filing our flight plan when going with the E or G models. I explain the difference between the models in the fuel capacity and gallons. I give the time and also the quantity when inspecting aircraft. When I checked the pilot out, I told him the flight time we could get on the E model. When we flew the E model I pointed out the difference between the gallons and time between the E and G models. As a matter of fact, just as I cleared him to solo, we landed touch-and-go and I emphasized it at this time. I don't remember saying to him that you have so many minutes left. I told him about the aircraft. I said you could fly some of them longer than an hour and a half and some of them for 2 hours, but because of the way these aircraft were used, it's only an hour and a half."

Q: "How do you evaluate him as a student?"

A: "As a pilot, about average to a little below average. I say this in regards to controllability. As far as thinking about what to do, he was good on that. His overall intelligence was above average."

Q: "The pilot impresses me as being quite capable as you said. Are you completely satisfied you made this discrepancy in fuel clear to him? Is there any remote possibility you failed to mention this?"

A: "Yes, I made it clear and there is no remote possibility. I think I made it real clear to him. One thing that might have been a contributing factor was that he flew the G model the first time and it was about 2 weeks before he flew again in the E model which was 40 minutes of autorotations."

Q: "He doesn't actually remember your mentioning this to him, much less emphasizing it."

A: "He had other things on his mind besides fuel."

Flight surgeon: "The pilot did not know the difference in the fuel capacity between G and E model OH-13 helicopters. He presumed he had approximately 17 gallons of gasoline more than he actually had. As to why he did not know of this difference, it is of course open to speculation or difference of opinion. It is my personal opinion he did not have a thorough checkout in the aircraft and the difference in fuel capacity was not properly emphasized to him. True, he is an inexperienced aviator, but he does appear of at least average intelligence and not overly preoccupied with personal problems. I can see no reason he should not have appreciated this valuable information had it been properly emphasized to him.

"I feel it should be further noted that the pilot had not received his full 10 hours of transition in the E model. Yet, he had a copilot who had never had any training in this particular model helicopter. For all practical value, the copilot was the same as a passenger . . . ."

"Directly contributing to this lack of fuel information was a gross piece of misinformation. His aircraft maintenance log (DA 2408-13) actually listed 46 gallons fuel capacity, instead of the existing 29-gallon capacity . . .

"This leads right into the subject of a faulty fuel gauge. The faulty gauge of this aircraft had been listed on the aircraft maintenance log for 4 months. According to the pilot, the gauge had registered empty for some time prior to the crash, but he did not view this as significant in light of the reported faulty gauge . . .

"The pilot involved listed his flight time as 1 hour more than his fuel capacity would allow prior to departure. The flight desk personnel either took no note of this, or simply did not know the fuel capacity of the aircraft. I certainly recommend that flight desk personnel be required to review flight plans for discrepancies such as this.

"Another unfortunate situation occurred when the pilot changed his original flight plan and did not notify the airfield. He supposedly tried but could not make radio contact. I am sure he could have made radio contact when he initially decided to change his route. The point here is that he conceivably could have crashed and burned or drowned somewhere, and we would still be looking for him. I feel it should be emphasized to all aviators to notify the airfield immediately when making a change in their planned route . . . ."

PEARL'S
personal equipment
and rescue/survival lowdown

discouraging reports

DESPITE TRAINING and emphasis on the correct use of personal equipment and survival gear, some of you apparently haven't gotten the word, or, worse, have chosen to ignore it. Here are two extracts from recent accident reports:

UH-1 gunner: "This was about the third time we had been in this LZ. . . . As we were coming up, we pulled up over the trees, lost rpm, made a turn of about 180°, started going down, and fell through. It felt like we were coming down about 1,000 feet per minute. Once we hit the ground, I jumped out and started helping the pilots out. . . . We got away from the helicopter because the rotor blade had broken off and the engine was turning at high rpm. As we got out of range, I remembered I had not seen the crewchief come out. I ran back, and as I got to the ship the crewchief was just starting to come to, so I went in and helped him out. We got up the hill away from the ship and I laid him down and called a medic over to help him. As the medic put a bandage over his cut, I noticed I was bleeding, so I told him and he put a bandage over my leg. . . .

"Our load on our last trip was ammunition, equipment, and water cans, weighing about 1,150-1,200 pounds, with about 600 pounds of fuel.

"During all this, neither I nor the crewchief were wearing seat belts because we have found out that seat belts endanger us more than they help us."

Comment: The aircraft commander and pilot of this UH-1 were wearing seat belts and shoulder harnesses. Neither was injured. The gunner and crewchief were not wearing their seat belts and both were injured by decelerative forces. Draw your own conclusion!

Battalion surgeon: "The O-1 observer sustained a scalp laceration, linear skull fracture, and a fracture of his left thumb. This individual was not on flight status at the time of the accident, but had applied for a class III flight physical. He had not received any briefings, except from the pilot. He was not issued flight gloves or survival equipment, and the helmet issued to him had no chin strap. He stated that he never fastened it anyway and was unaware of the importance of doing so.

"At the moment of impact, his seat belt was fastened and worked. His shoulder harness was not locked. His helmet came off his head immediately and the patient was stunned, although he does not believe he lost consciousness. The linear skull fracture indicates what happens without a helmet for protection. Both men were soaked with fuel from the ruptured tanks above their heads. There was no fire, but both suffered minor contact dermatitis from the fuel. The observer did not have his sleeves rolled down. . . .

"The pilot had a broken left leg, broken bones in his left hand, and abrasions on the left side of his face. He was wearing a helmet and gloves, and his sleeves were rolled down. Both the seat belt and shoulder harness were fastened and the shoulder harness was locked. . . .

"The first aid kit was unavailable because it was destroyed with the aircraft. The RT-10 radio and

if you have a question about personal equipment or rescue and survival gear, write to Pearl, U. S. Army Board for Aviation Accident Research, Ft Rucker, Alabama 36360

personal survival kit were not fastened on the pilot and both were thrown out of the aircraft at impact. Both should be affixed to crewmembers. If these individuals had not been able to search the area — and only the observer who had a skull fracture was — the radio would have been lost. Without radio contact, their rescue would have been greatly delayed. . . . It is strongly recommended that all individuals who fly be briefed by a responsible person on first aid and survival procedures, and that the proper equipment be made available to them.

"If an aviation unit is to be responsible for crewmembers from a ground unit, as was the case of the observer in this accident, the aviation unit must brief and equip them."

MORE ON U-21 OXYGEN EQUIPMENT

Reference our reply to SFC Sam Freeman on page 54 of the March issue, USAAVCOM advises that the oxygen assembly tube (FSN 1660-692-3939) is a component of the oxygen mask and does not need to be requisitioned separately when the mask is requisitioned. However, the tube may be requisitioned separately if required without the mask.

An essential item for U-21 crewmember oxygen masks is the "microphone, oxygen mask, type M133/U (FSN 5965-900-8102)." This item is not a component of the oxygen mask assembly and must be requisitioned separately.

All crew oxygen equipment is requisitioned through normal unit supply channels, as is the flight helmet. Disposable masks provided for passengers are requisitioned through tech supply channels.

ASSUMED KNOW-HOW

INVESTIGATION BOARD narrative: "A request for a cargo drop was accepted. The pilot briefed the crewchief on hand signals to be used and told him to snap the static lines to the tiedown rings after the bundles were loaded. The U-6A was flown to the northeast strip and the bundles were loaded. The pilot took off and climbed to 300 feet en route to the drop zone. Reaching the drop zone, he made one pass over the field and smoke was thrown to indicate drop clearance. He made another pass and the first of two bundles was pushed out. Witnesses stated that the bundle remained attached to the aircraft, with the chute undeployed.

"Another pass was made and the second bundle was pushed out. Witnesses on the ground stated that the parachute on this bundle partially deployed. The tremendous drag induced by the partially deployed parachute caused the aircraft to rapidly lose airspeed and altitude.

"The pilot applied full power in an effort to gain airspeed and reduce the descent. The aircraft descended until the chute and bundles struck a tree, knocking off a part of the rations, as well as the undeployed chute. The partially deployed chute was torn and ripped, causing it to offer less drag. The pilot was able to keep the aircraft in the air for another 675 feet before striking two more trees. The copilot saw sparks at that time. The aircraft then veered to the right, striking another tree. The right main gear hit and collapsed; the right wing tip struck the ground; and the aircraft pivoted to the right. As the right wing came up, the left main gear struck and collapsed. The fuselage hit and slid for 50 feet. The aircraft caught fire and burned. The three occupants escaped with minor injuries.

". . . Because of lack of training and an inadequate and confusing briefing by the pilot, the crewchief did not hook up the static lines to the cargo tiedowns as prescribed in TM 10-500 and TM 10-500-6. Instead, he hooked up the risers of the G-13 cargo parachutes to the aircraft cargo tiedowns . . .

"The first bundle remained attached to the aircraft by the risers. The pilot was not aware that the bundle remained attached. Ground personnel could not contact him on radio, as the aircraft had no FM radio. No prearranged signals for a 'don't drop' con-

dition had been established. Ground personnel had no means to warn the pilot that the bundle was still attached. . . .

"As the second bundle fell, the risers and suspension lines separated and the parachute bag was torn away, allowing the parachute to partially deploy. The first bundle parachute did not deploy because the risers were held together by the spreader bar. Consequently, the risers and suspension lines could not separate. The second bundle also remained attached to the aircraft. . . ."

The pilot was interviewed by the accident investigation board:

Q: "What instructions did you give the crewchief about how to hook the static lines to the tiedowns on the floor?"

A: "The only instruction I gave him was to make sure the static lines were connected to the eye-bolt on the floor of the aircraft."

Q: "Did you show him at any time, or give him any briefings to show him what the static line was?"

A: "No sir. I did not. This was more of an assumption on my part. I thought he would know what it was."

Q: "Did you know what the crewchief's experience was in this aircraft? Did you know that this was the first time he had flown in a U-6?"

A: "I knew that it was the first time he had flown here, but I did not know it was the first time he had gone in a U-6."

Q: "Had he ever flown with you?"

A: "He had never flown with me before."

Q: "Do you have any type of SOP covering paradrops?"

A: "To my knowledge, no sir."

Q: "When a new pilot reports to this unit, how is he checked out in paradrops?"

A: "When I came here, I flew on two drops with another pilot. He showed me how it was done and then I flew one with him."

Q: "Did you receive any kind of briefing from him on how the drops should be made, or how the chutes should be rigged, or anything of this nature?"

A:"Yes sir."

Q: "Did he cover it thoroughly with you?"

A: "I think so."

Q: "How did he explain to you that the static lines would be attached to the cargo tiedowns?"

A: "As far as I can remember, he did not explain how to attach the static lines to the cargo tiedown rings."

Q: "Can you tell me what kind of experience the crewchief has in making paradrops?"

A: "No experience, to my knowledge. As far as I know, it was his first time going out to drop."

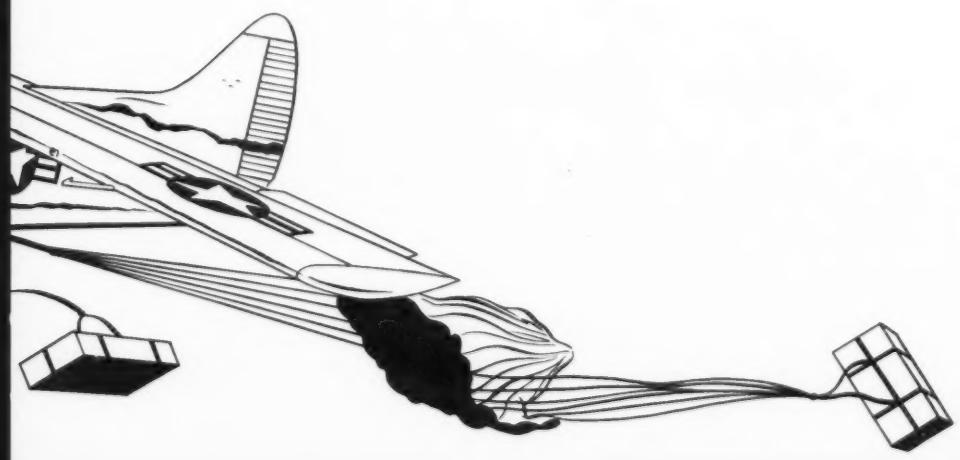
Q: "Did you tell the crewchief to specifically tie down or to hook up the static line?"

A: "I told him to hook the tiedown."

Q: "You did say specifically that he would hook the static line up?"

A: "I told him to hook it to the tiedown ring. This was another thing I assumed he knew. I assumed he knew how to hook a static line to the tiedown ring in the aircraft. I did not go through it

"I assumed the crewchief knew how to hook a static line to the tiedown ring . . . I didn't go through it step by step . . . I guess I should have"



step by step on how to hook up a static line. I guess I should have."

Q: "You thought there was a clamp on the static line to hook to the tiedown ring?"

A: "I knew there were clamps on this thing."

Q: "Do you have anyone at the drop zone that checks your load and checks the bundles in the aircraft?"

A: "We do not. Our people here are not qualified riggers. They just pack the chutes."

Q: "They are riggers, but they are not qualified riggers?"

A: "They are not school trained to do this. The maintenance people in the aviation section pack the parachutes. The people from the brigade attach the parachutes to the bundles. The crewchief in the aircraft attaches the static lines to the aircraft."

Q: "Whose responsibility is it to check to see if the crewchief properly rigs or ties or snaps the static line to the aircraft?"

A: "That is the pilot's responsibility. I told the crewchief two things: (1) Be sure that the static lines are attached to the aircraft. (2) Be sure you are attached and secure. I didn't get up out of my seat to go back and check. I asked him 'Do you have the static lines attached to the tiedown ring?' He said, 'Yes sir.' I then asked if he was secured and he replied, 'Yes sir.' "

The board then interviewed the crewchief:

Q: "How long have you been crewing this aircraft?"

A: "That was my first flight in this aircraft."

Q: "Have you crewed a U-6 before?"

A: "No sir."

Q: "Have you worked with paradrops before?"

A: "No sir."

Q: "Was this the first time you ever worked with door bundles?"

A: "Yes sir."

Q: "Did you at any time read an SOP on paradropping?"

A: "No sir."

Q: "You never had any instruction at all?"

A: "No sir. I have never received any instruction."

Q: "What type of aircraft did you crew before?"

A: "I never crewed an aircraft, sir. I went to school for a CH-21."

Q: "What equipment did you have during this particular flight?"

A: "I had a harness on, which was attached to the D-rings in the aircraft. I had no head gear."

Q: "Were you wearing gloves?"

A: "No sir."

Q: "How were you dressed?"

A: "I was dressed in fatigues."

Q: "Did you have any means to cut webbing in case it became entangled?"

A: "No sir."

Q: "You had no tools or anything that you could possibly have cut with?"

A: "No sir. I had nothing with me. All I had was my change and my keys."

Q: "Was there a parachute available to you at the time of the accident?"

A: "No sir."

Cause factors: "The board feels that lack of training was the most outstanding deficiency that caused this accident. The crewchief had never flown in a U-6A and had no previous knowledge of cargo parachute drops. The briefing he received was inadequate and confusing.

"Maintenance personnel packed and prepared the parachutes, but none were qualified to do so. Had qualified personnel packed and prepared the chutes, proper rigging and drop procedures probably would have been employed.

"Although the pilot is a very qualified aviator, he is not familiar with the procedures outlined in TM 10-500 and TM 10-500-6 pertaining to airdropping equipment from Army aircraft.

"The pilot assumed that the crewchief was familiar with cargo parachutes and airdropping of supplies. He instructed the crewchief to hook or snap the static lines to the aircraft tiedowns. Had he shown or instructed the crewchief about the proper method of attaching breakaway static lines to the aircraft, this accident could have been avoided.

"After landing at the northeast strip, the pilot failed to check the bundles for proper rigging, security, and attachment of the static lines.

"Supervision is considered to be the second most important deficiency. No SOP had been written outlining procedures for cargo parachute drops. No means to ensure adequate training prior to releasing pilots to fly these missions had been established.

"Although the command regulation is very specific in outlining procedures for personnel parachute jumping, nothing could be found to give guidance for airdrop operations. No reference to TM 10-500 or TM 10-500-6 could be found."

Nonrelated factors: "Safety belt was not provided for the crewchief, as required by paragraph 28c, AR 95-1.

"No parachute was available for the crewchief, as required by paragraph 28a, AR 95-1.

"No APH-5 protective helmet was worn by the crewchief, as required by a command regulation."

THIS IS HOT

(WHITE HOT)

HOT OFF THE PRESSES at the U. S. Army Aviation School, ST 57-210-1 is a manual you and commanders and staff officers will want. It contains the principles and techniques of tactical air movement as applied to combat, combat support, and service support units. It is especially designed for the ground unit commander to facilitate his planning of tactical air movements.

Covering mission planning and typical operations, the manual describes the air movement of infantry, artillery, engineer, and combat service support units to include the responsibilities of the supported and supporting units, liaison requirements, communications, and pathfinder utilization. Though geared to the CH-47 helicopter, the guidance it offers can be applied to any light, medium or heavy lift aircraft. It covers internal and external loading capabilities, to include the most recently approved procedure for sling-loading artillery howitzers, along with the weights of major items of chemical, engineer, medical, ordnance, quartermaster, signal, and transportation items of equipment.

About 2,000 copies of this recently published text have been shipped to Army aviation units in Vietnam. This distribution was based on instructions from USARV Headquarters.

A lot of effort went into it — stateside and overseas — but it can't help you if you don't get it and use it. If you need more copies or happen to have missed out in the distribution, write the Commandant, U. S. Army Aviation School, ATTN: AASPI, Fort Rucker, Ala. 36360, for the copies you need.

26th Anniversary of Army Aviation

Shortly after its birth on 6 June 1942, Army aviation was being employed in all theaters of World War II. Initially it was often "carried" into combat much as the L-4 above is being offloaded from an LST in New Guinea. But throughout the years Army aviation's potential has been continually developing and today it "carries" the load — as the CH-47s are doing on the front cover